Bruneau Subbasin Assessment
and
Total Maximum Daily Loads
of the
§303(d) Water Bodies

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ACRONYMS AND GLOSSARY

The acronyms and glossary used in this document are summarized in the following list. The list is only inclusive for those terms used in this Subbasin Assessment.

TERM	***DEFINITION***
BAG	Basin Advisory Group
BRO	Boise Regional Office of Idaho Department of Environmental Quality
BURP	Beneficial Use Reconnaissance Project of IDEQ.
CFU	Colony forming Unit.
CMS	Cubic Meters per Second (m^3/s)
Ephemeral stream	A stream which functions as a drainage channel that is normally dry but carries water in response to storms or annual snowmelt. There is no IDAPA definition. The USBLM describes ephemeral streams as streams that flow for brief periods of time. Many ephemeral streams do not appear on USGS maps as solid blue lines like the perennial streams do.
GIS	Geographic Information System
HUC	Hydrologic Unit Code (USGS designation)
HUC 17050102	Bruneau River Subbasin
HUC 4th Field	subbasin hydrologic unit
HUC 5th Field	Watershed hydrologic unit (a sub component of 4th Field HUCs)
IDAPA	The Idaho Administrative Procedures Act. Rules promulgated by the state of Idaho are referenced by their IDAPA number.
IDL	Idaho Department of Lands
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDWR	Idaho Department of Water Resources
Intermittent stream	IDAPA §58.01.02.003.50 defines intermittent stream(s) as "a stream that has a period of zero flow for at least one week during most years. Where flow records are available, a stream with a 7Q2 (the lowest flow that occurs in seven consecutive days within a two year period) hydrologically based design flow of less than one-tenth (0.1) cfs is considered intermittent. Streams with perennial pools, which create significant aquatic life uses, are not intermittent." USBLM describes intermittent streams as streams that have periodic interruptions in a normal pattern or process. USDAFS describes intermittent streams as streams in contact with the groundwater table that flow only

TERM	*DEFINITION*
	certain times of the year, such as when the groundwater table is high, or when they receive water from springs or from some surface source such as melting snow in mountainous areas. They cease to flow above the streambed when losses from evaporation or seepage exceed the available stream flow (USFS 1997d).
LA	Load allocation. The amount of a pollutant ascribed for nonpoint source industries in a TMDL
LC	Load Capacity. The amount of pollutants that a water body can assimilate and still support the beneficial uses.
Man-made water body	IDAPA §58.01.02.003.57 defines man-made waterways as "canals, flumes, ditches, and similar features, constructed for the purpose of water conveyance."
MOS	Margin of safety in a TMDL
Nonpoint source	Any unconfined and diffuse source of contamination, such as stormwater, snowmelt runoff, or atmospheric pollution. Legally, a nonpoint source of water pollution is any source of water pollution that does not meet the definition of "point source" in §502(14) of the Clean Water Act (USEPA 1997 [p. xii])
NRCS	Natural Resources Conservation Service
NPDES	National Pollution Discharge Elimination System Permit. Issued by USEPA for the state of Idaho.
Perennial stream	A stream that flows year-round in most years. There is no IDAPA definition. USBLM describes perennial streams as streams which have uninterrupted flow from year to year. USFS describes perennial streams as streams that flow continuously throughout the year (permanently) (USFS 1997d).
Point source	Any discernable, confined, or discrete conveyance (pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel, or other floating craft from which pollutants are or may be discharged (USEPA 1997).
QA/QC	Quality Assurance/Quality Control
SBA	Subbasin Assessment
SCC	Soil Conservation Commission
SCD	Soil Conservation District
TFRO	Twin Falls Regional Office of IDEQ
TMDL	Total maximum daily load. The standard formula for a TMDL is TMDL= Loading Capacity= Assimilative Capacity= Point Source Wasteloads+ Nonpoint Source Loads+ Margin of Safety.

TERM	*DEFINITION*
TP	Total Phosphorus
USBLM	United States Bureau of Land Management
USDA/ARS	United States Department of Agriculture/Agriculture Research Service
USEPA	United States Environmental Protection Agency
USDAFS	United States Department of Agriculture Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload allocations for point source facilities.
WAG	Watershed Advisory Group

1.0 EXECUTIVE SUMMARY OF THE BRUNEAU RIVER SUBBASIN ASSESSMENT AND TMDL DEVELOPMENT

The Clean Water Act established a process for restoring the nation's water bodies to health. Part of this was the designation of impacted waters by the states, through listing such waters as in §303(d). The 1996 §303(d) list for the state of Idaho (EPA 1996) included 16 segments occurring within the region designated as the Bruneau River Subbasin. Nine segments remain on the 1998 §303(d) list. The Bruneau River Subbasin Assessment and Total Maximum Daily Load (SBA-TMDL) for surface waters of the Hydrological Unit Code 17050102 describes those nine water bodies and 19 pollutants that are listed on the 1998 §303(d) list prepared by the state of Idaho. In addition, two additional pollutant water body combinations are included in the SBA-TMDL. The listed water bodies are considered "water quality limited" and may not meet their beneficial uses as defined by state of Idaho water quality standards. The SBA provides information pertaining to existing and designated beneficial uses. The information in the SBA includes those pollutants and the sources of pollutants that are affecting these beneficial uses. The information was obtained from a variety of sources including monitoring efforts of Idaho Department of Environmental Quality (IDEQ) and other agencies and individuals. The public has also been involved in the development of the SBA-TMDL through a variety of venues. Most notably, public meetings were held within the subbasin at various locations. Principally public meetings were held in the towns of Bruneau and Three Creek. The general physical and biological characteristics of the Bruneau River Subbasin have a strong influence on the water quality of the subbasin. Land use in the subbasin is predominantly rangeland. Limited irrigated agriculture also exists in the subbasin where water is either pumped from the ground or diverted from the river and tributaries. The major population center of the basin is the Bruneau-Grand View area.

The subbasin contains three different water sources. The first of these is seasonal runoff from the snowpack in the southern mountain region. The second is the thermal aquifer below Bruneau and Grand View, which is part of the Western Snake River Plain Aquifer. The final source is from precipitation events on the unintegrated ephemeral channels of the Bruneau subbasin plateau. These sources affect water quality to varying degrees. The geothermal water from the local thermal aquifer may affect water quality most significantly as the amount of water entering the streams and rivers of the subbasin from the other sources changes seasonally. Ephemeral surface channels can influence the water quality of the river and streams by adding a significant but rare and random pollutant load. However, this influence may only be seen during higher flow periods in the various waterbodies.

The subbasin land forms, vegetation, topography, and precipitation can be defined by two ecoregions. The predominant ecoregion of the subbasin is the Snake River Basin High Desert. The Snake River Basin High Desert ecoregion is predominantly sage-steppe grasslands. Most of the surface streams are intermittent or ephemeral in nature due to low annual precipitation and evaporation. Consequently, limited riparian habitat exists within the subbasin. Those streams that remain perennial usually form from spring sources in the southern mountains of the subbasin or from the thermal aquifer that underlies the town of Bruneau. Along these stream courses some riparian habitats persist.

Sediment is the most common listed pollutant in the subbasin. Sediment was a listed pollutant on all 1998 §303(d) listed waterbodies within the subbasin. Other listed pollutants and stressors include nutrients, low dissolved oxygen, flow, and bacteria. The SBA portion of the SBA-TMDL determines the current amount of a particular pollutant in each of the §303(d) listed water bodies' watersheds. The SBA also determines what impact to the beneficial uses each pollutant may have.

In general, the impacts to the beneficial uses were determined by assessing the biological communities and the limited water chemistry data available. When these two data sets were in agreement with one another, appropriate actions, such as completing a TMDL or delisting the stream, were undertaken.

In general, the water quality of the Bruneau River is very good. Furthermore, limited impacts have occurred in the upstream watersheds. As a result, water quality reflects this. Concentrations of suspended materials (as suspended

solids and sediment) are very low throughout the subbasin. However, on a seasonal basis the Bruneau River and other surface waterbodies exceed state water quality standards for a single or multiple pollutant such as excessive nutrients, temperature and/or other pollutants. The temperature exceedances may be due to the influence of the thermal spring waters. These waters form the principle habitat for the endangered species the Bruneau Hot Springsnail. However, in all cases of the §303 (d) listed water bodies, annual average concentrations of total suspended sediment are below 50 mg/L in the subbasin. Although in some cases suspended sediment concentrations did exceed the 80 mg/L daily maximum targets in some samples. However, due to the natural variability of the various systems and the limited samples available for analysis (one sample a month in most cases) limited weight should be given to individual samples. Therefore, IDEQ asserts that the annual average concentration is a more robust measure that reflects the overall conditions of a water body. Although, due to the averaging period constraints of the targets (monthly average and daily maximum) waters with exceedances of theses two averaging periods will be considered for TMDLs even though the annual average concentrations are low. By doing so seasonal components of water quality degradation and critical conditions are more fully addressed. In the case of suspended sediment, the concentration of 50 mg/L TSS monthly average and 80 mg/L daily maximum concentrations have been determined by the National Academy of Science and National Academy of Engineers to provide for protection of aquatic communities and by defacto acceptance by the state of Idaho and USEPA through several TMDLs. However, the bedload sediment (surface fines) in the Three Creek watershed is higher than that of a fully supported creek within the same area while suspended sediments are below the 50/80 mg/L targets. In the Three Creek watersheds surface fines averaged 54 percent, well above a comparison stream's average of 40 percent. As a result, the TMDL for the Three Creek Watershed will require a 44 percent reduction in surface fines (or bedload).

Nutrients are a listed pollutant in the Bruneau River and Jacks Creek segments of the Bruneau River Subbasin. In these reaches it was determined that total phosphorus (TP) can be a limiting nutrient, and that all nutrients may be in excess of USEPA Blue Book recommendations. Therefore, a reduction in TP would provide the greatest reduction in nuisance aquatic vegetation. Background TP concentrations at the beginning of the §303(d) listed segment of the Bruneau River were near 0.023 mg/L annual average; concentrations near the end of the reach annually averaged 0.083 mg/L. Only nonpoint sources and naturally soil-associated phosphorus contribute to this increase in TP concentration as there are no point sources located within the watershed. In the Jacks Creek watershed annual TP concentrations averaged 0.202 mg/L. The United States Environmental Protection Agency has set guidelines for TP concentrations in rivers flowing into lakes and reservoirs. As a result, the Bruneau River and Jacks Creek TP concentration target is set at 0.05 mg/L. A 37.5 percent reduction in TP will be required for nonpoint sources within the Bruneau River Watershed, and a 75.25 percent reduction will be required for point and nonpoint sources in the Jacks Creek watershed in order to meet these targets.

The other listed streams and pollutants in the subbasin, in general, were well below any standard or guideline established for the protection of beneficial uses or were dry for all of (or a majority of) the year. From information gathered for the SBA, it was determined that three of the listed waterbodies should not have been considered water bodies which would have supported beneficial uses and were therefore originally listed in error. For example, Sugar Creek had a U.S. Geological Survey peak flow gauge for ten years. During this period, eight of the ten years peak flow was zero cubic meters per second. The two other creeks (Cougar Creek and Poison Creek) were assessed by the Idaho Department of Fish and Game and the Idaho Department of Environmental Quality (IDEQ) under a Bull Trout Problem Assessment. In the assessment it was determined that the streams were ephemeral and likely did not ever support a fishery. IDEQ Beneficial Use Reconnaissance Project monitoring over the last five years corroborates the ephemeral nature of the streams. The IDEQ has determined, for these streams, that their original listing was in error due to their potential for recreational and aquatic life beneficial uses being nonexistent.

Flow and habitat alteration issues were not discussed in the SBA-TMDL due to current IDEQ policy. It is IDEQ policy that flow and habitat alteration are pollution and therefore not a "TMDLable" pollutants. These forms of pollution will remain on the §303(d) list; however, TMDLs will not be completed on segments listed with altered flow or habitat as a pollutant at this time.

Temperature, under the current standards, is a minor problem in some segments of the Bruneau River Subbasin. However, this is generally considered by the residents of the Bruneau area to be a natural problem. Additionally, in other areas of the state bioassessment data conflicts with concurrent temperature information and water quality standards. This is likely the result of the state's current water quality standards being derived from an outdated understanding of the cold water biota's temperature requirements. Consequently, IDEQ is participating in a regional review of temperature criteria, which is being organized by USEPA Region 10. Following the conclusion of the temperature review, temperature exceedances in the Bruneau River Subbasin will be reassessed and, if needed, a temperature TMDL will be completed.

The following tables summarize the TMDLs to be completed, delayed, or delisting actions as a result of the Bruneau River SBA-TMDL.

Table 1. TMDLS TO BE COMPLETED IN THE BRUNEAU RIVER SUBBASIN

Segment	TMDL-pollutant	TMDL-pollutant	TMDL-pollutant	TMDL-pollutant
Bruneau River	Nutrients - TP			
Jacks Creek	Nutrients -TP	Dissolved Oxygen -TP	Bacteria	Sediment- TSS
Three Creek	Sediment - percent fines			
Clover Creek	Bacteria			
Sugar Valley Wash	Nutrients -TP	Dissolved Oxygen -TP	Bacteria	Sediment- TSS

Table 2. DELISTINGS IN THE BRUNEAU RIVER SUBBASIN

Segment	TMDL-pollutant	TMDL-pollutant
Bruneau River	Sediment	
Hot Creek	Sediment	Bacteria
Clover Creek	Sediment	
Cougar Creek	Sediment	
Poison Creek	Sediment	
Sugar Creek	Sediment	
Wickahoney Creek	Sediment	

Table 3. TMDLS DELAYED IN THE BRUNEAU RIVER SUBBASIN

Segment	TMDL-pollutant	TMDL-pollutant
CJ Strike- Bruneau Arm	Nutrients	Pesticides
Bruneau River	Flow Alteration	Temperature
Jacks Creek	Flow Alteration	Temperature
Wickahoney Creek	Flow Alteration	
Hot Creek	Flow Alteration	

2.0. INTRODUCTION

The Bruneau Subbasin Assessment and Total Maximum Daily Load (SBA-TMDL) describe those water bodies in Hydrologic Unit Code (HUC) 17050102 originally listed on the 1996 §303(d) list of the Clean Water Act. In this HUC, seventeen water bodies were listed in 1996. Two were segments of the Bruneau River. One is a section of the CJ Strike Reservoir known as the Bruneau arm. The remaining segments were tributaries to the Bruneau or Jarbidge Rivers. In the next iteration of the §303(d) listing cycle (1998), seven water bodies were removed from the 1996 §303(d) list. At that time it was determined that the seven water bodies met state standards and their beneficial uses were fully supported. Those water bodies included Mary's Creek, two segments of Sheep Creek, Big Flat Creek, Cherry Creek, Deadwood Creek, and one segment of the Bruneau River. These water bodies will not be covered by this SBA-TMDL. The 1998 delisting of these seven water body segments has been approved by the United State Environmental Protection Agency (USEPA). Upon finalization of this Bruneau River SBA-TMDL, some of the remaining segments will be removed from the §303(d) due to TMDL completion or other factors identified in the SBA-TMDL. Others will be delayed until a later date as described in the following sections of this document (see figure 1 for all 1998 listed water bodies). However, the Bruneau arm of CJ Strike will be incorporated into the upcoming CJ Strike Subbasin Assessment and TMDL due to USEPA in 2004. The assessment and data collection for the Bruneau arm of the reservoir was delayed to better utilize resources for the remainder of the subbasin and in future subbasins. By incorporating the reservoir section of the subbasin into the CJ Strike assessment, which is dominated by reservoir conditions, better data can be collected for the Bruneau arm. This improvement of data collection will arise due to IDEQ monitoring abilities and equipment requirements for a reservoir system being consolidated into one assessment and TMDL.

2.0.1 Identification System

Throughout this SBA-TMDL, the watershed delineation and numbering system (HUCs) developed by the United States Geological Survey (USGS) will be used. This system provides a standard method for describing subbasins and the watersheds within a particular subbasin. The Bruneau River Subbasin corresponds with the fourth field HUC of 17050102. Within this subbasin, 36 watersheds have been delineated as fifth field HUC. Further resolution of subwatersheds (sixth field HUCs) is possible within the HUC system but will not be used in this SBA-TMDL. Figure 2a shows HUC 17050102 in relationship with other surrounding HUCs. Figure 2b shows the Bruneau River Subbasin in relationship with the state of Idaho. Figure 3 shows the 36 watersheds found within the Bruneau River Subbasin. Load allocations will be based upon the land uses identified by Geographic Information System (GIS) in the fifth field HUC watersheds of the subbasin. However, if a stream makes up only a small portion of a watershed's hydrology, a river corridor approach will be taken to set load allocations.

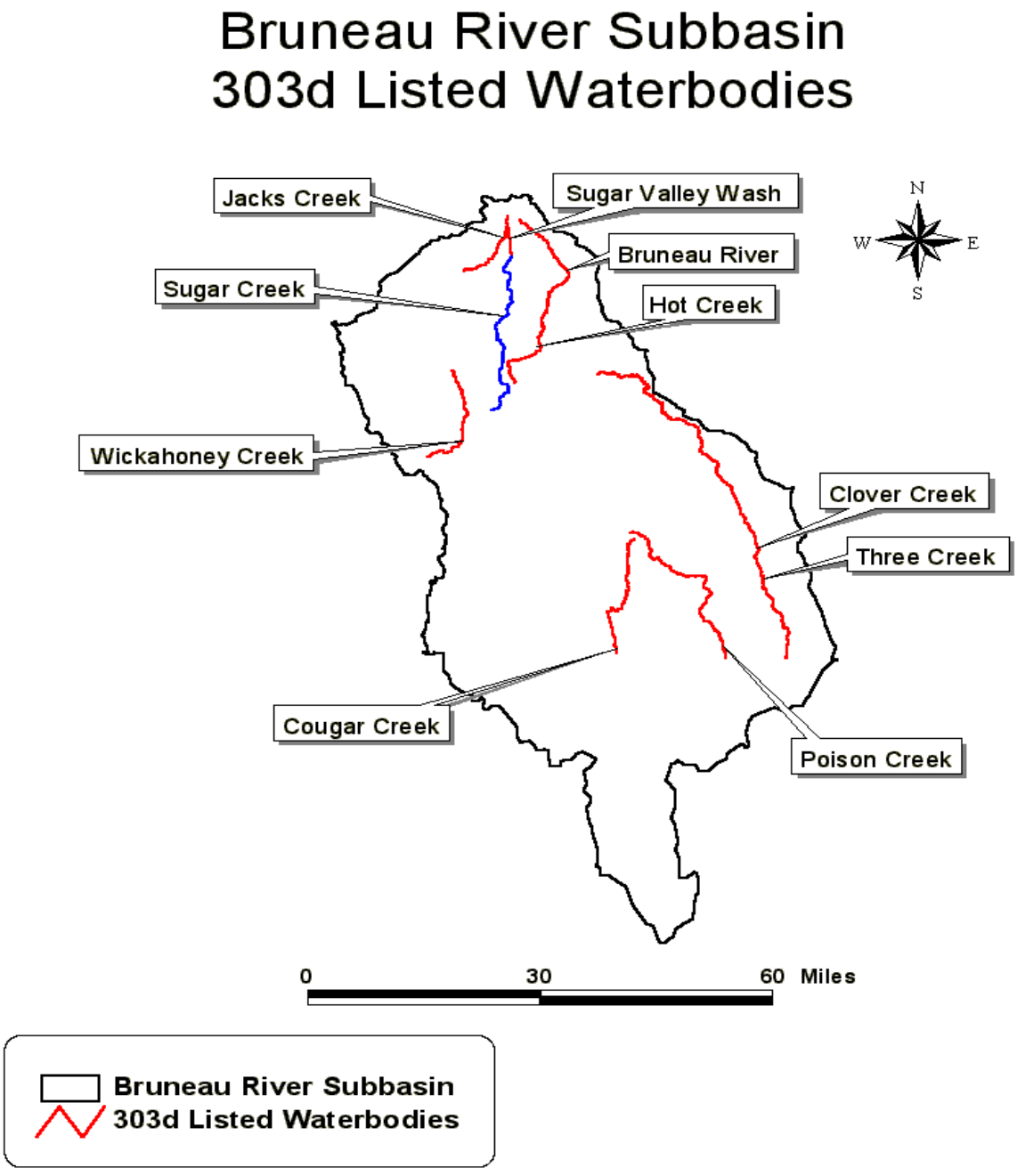


Figure 1. 1998 §303(d) Listed Water Body Locations

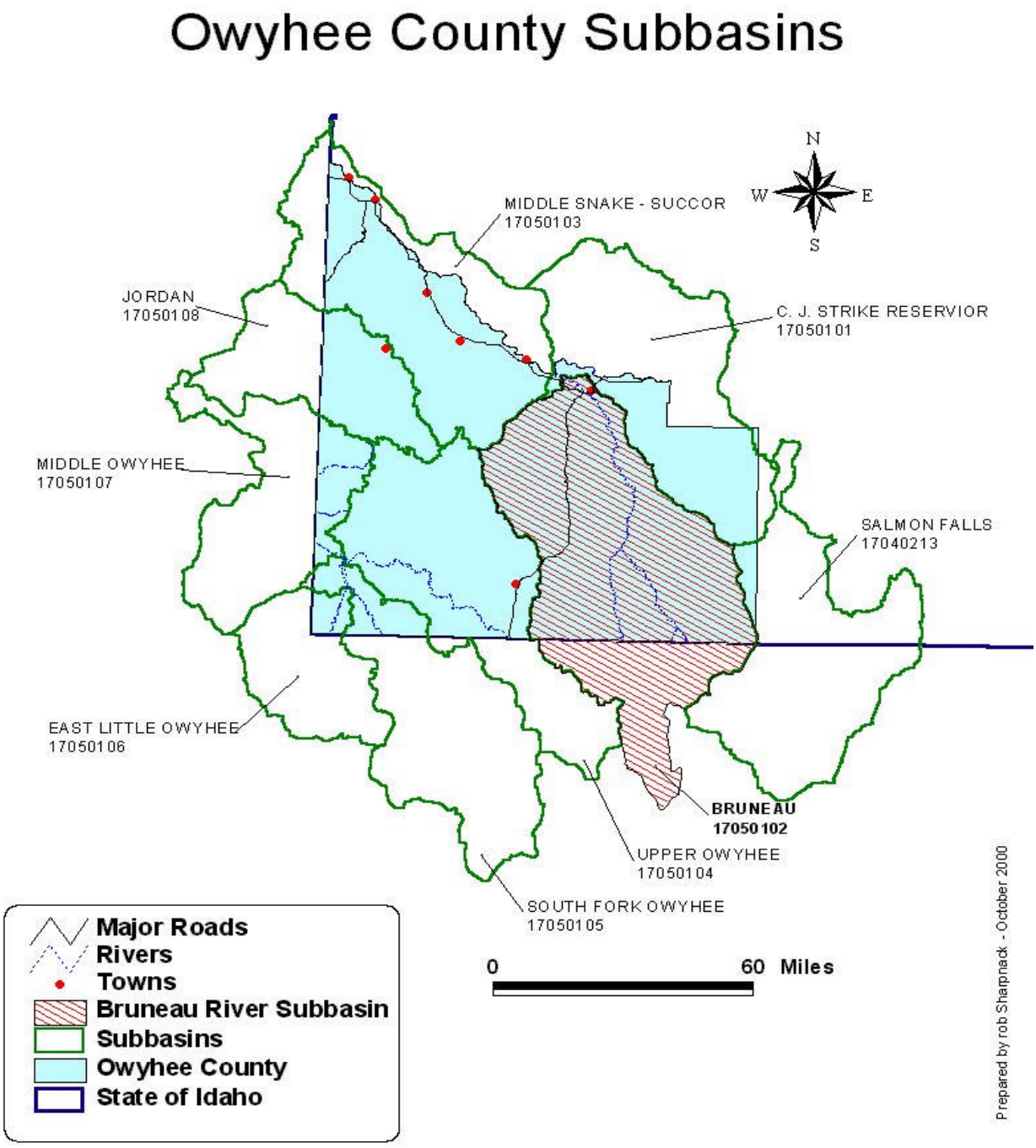


Figure 2a. Bruneau River Subbasin in Relationship with Surrounding subbasins.

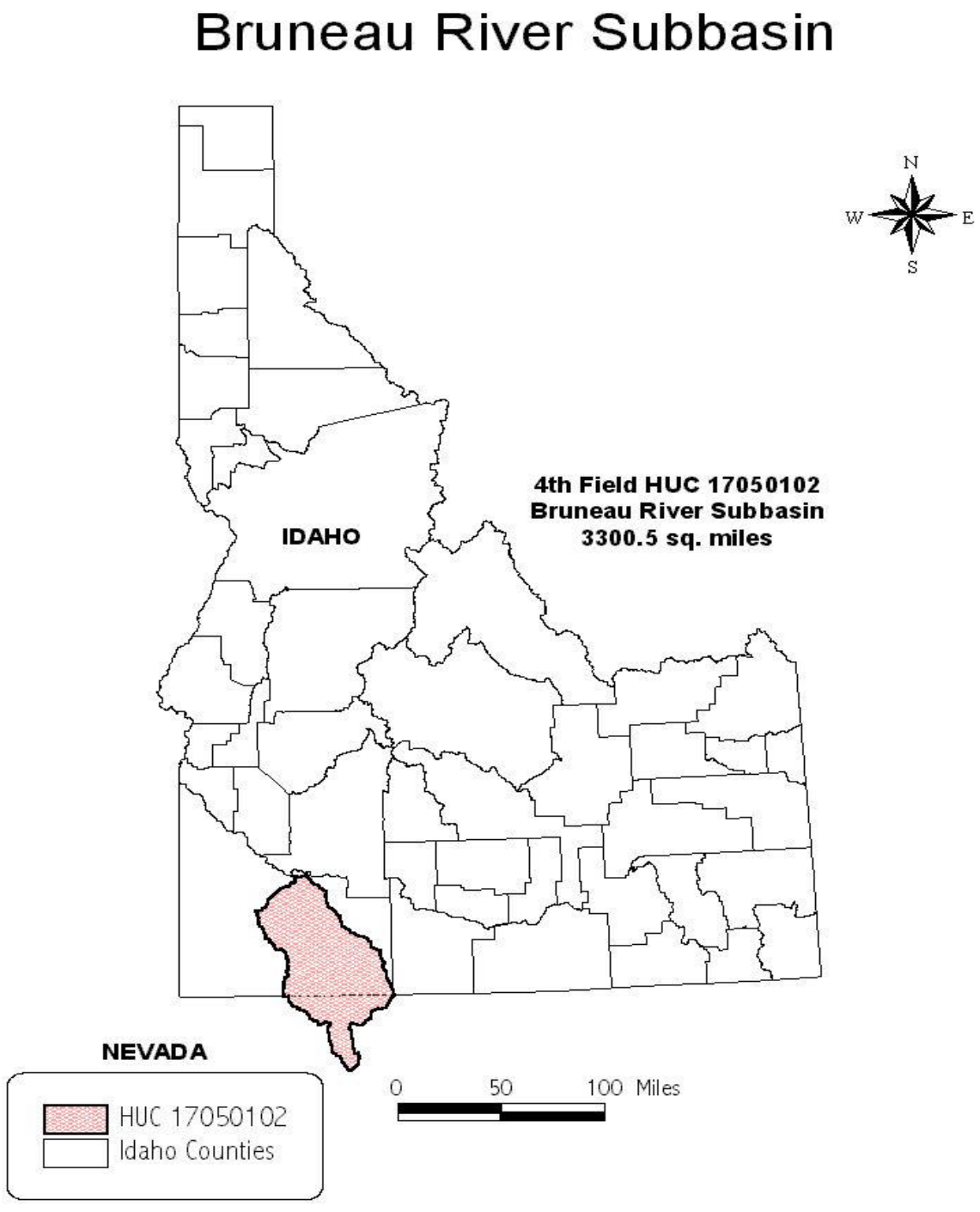


Figure 2b. Bruneau River Subbasin in Relationship with the State of Idaho.

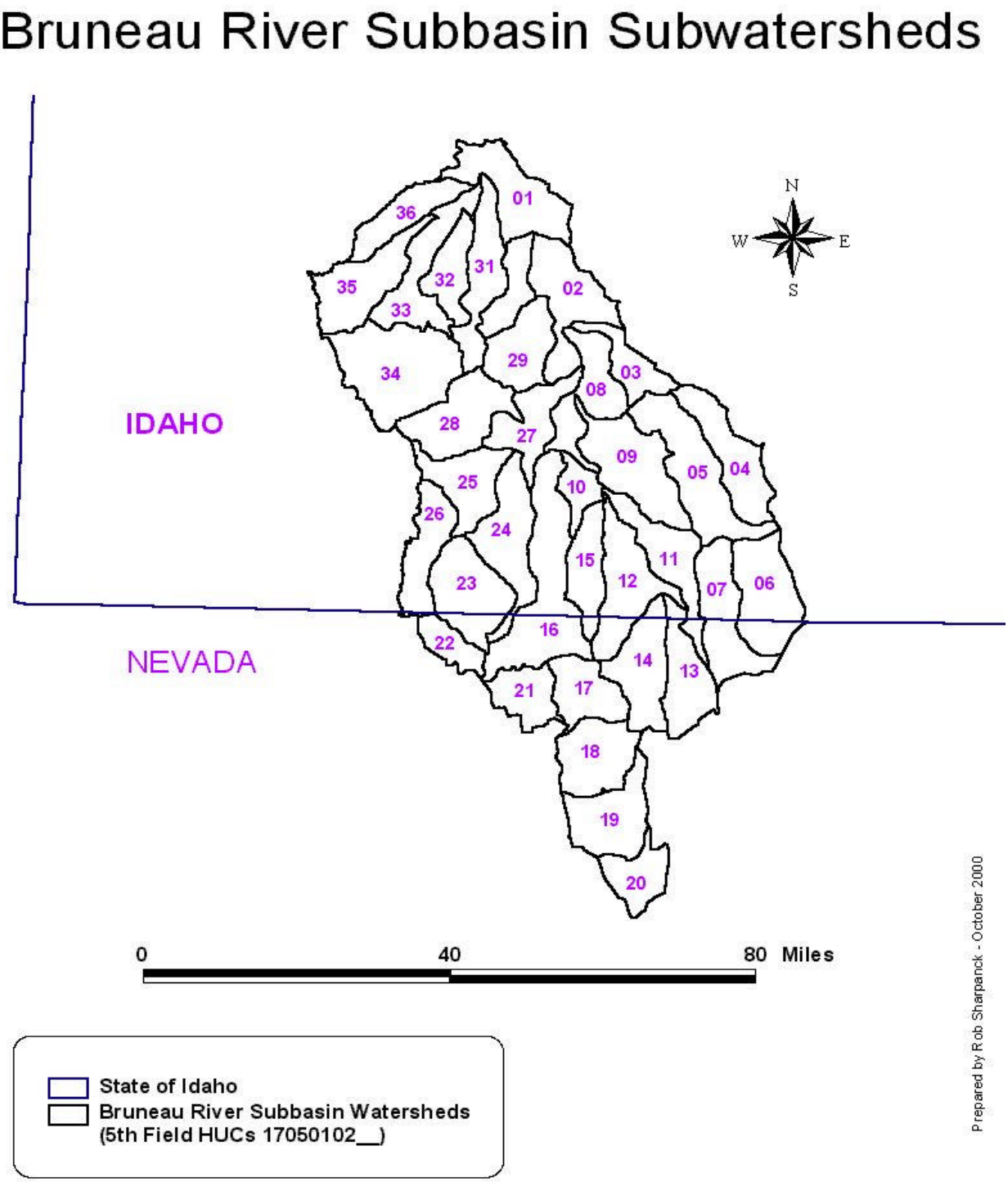


Figure 3. Bruneau River Subbasin Watersheds of Idaho and Nevada.

2.0.2 Compilation of Databases

The development of a SBA-TMDL requires a substantial amount of data collection from sources other than Idaho Department of Environmental Quality (IDEQ). However, data from other sources was very limited in the case of the Bruneau River SBA-TMDL. Those sources, besides IDEQ- Twin Falls Regional Office's (TFRO) ambient water quality monitoring, included USGS, U.S. Fish and Wildlife Service (USFWS), USEPA, U.S. Bureau of Land Management (USBLM), U.S. Department of Agriculture/Agricultural Research Service, Natural Resources Conservation Service, Idaho Department of Fish and Game (IDFG), Idaho Department of Lands (IDL), Idaho Department of Water Resources (IDWR), Idaho Soil Conservation Commission, Bruneau River Soil Conservation District (BR/SCD),and the IDEQ Beneficial Use Reconnaissance Project (BURP) .

The compilation and review of data from these sources focused primarily on assessing the beneficial uses of the rivers and tributaries within the subbasin. Assessments were completed if the rivers and streams had other data associated with them in addition to IDEQ BURP data. However, the focus was primarily on the 1998 §303 (d) listed streams and rivers. Other streams and rivers with no BURP data associated with them will also be addressed in this SBA-TMDL if water quality standards and or beneficial uses are not met. Load allocations and waste load allocations will be based on all available water chemistry data or appropriate surrogate measures. It is expected that where current technology-based controls are inadequate to achieve water quality standards, the implementation of a TMDL will provide more stringent water quality-based controls. The Bruneau River Subbasin TMDLs will be structured on wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources, and a margin
of safety (MOS): where TMDL = WLA + LA + MOS. The MOS will account for scientific uncertainty in the TMDL due to insufficient or poor quality data, lack of understanding in receiving waters assimilative capacity, and the lack of understanding of the effects of pollutant loading rates on the load capacity of receiving waters. The MOS, most often, will be implicit due to a conservative approach taken in determination of load capacity, point and nonpoint source loads, and conservation of pollutants in modeling.

2.0.3 Public Involvement

As envisaged in Idaho's 39-3601 et seq. legislation and Idaho's TMDL process, Watershed Advisory Groups (WAGs) are to be used to encourage public participation. Public involvement for the Bruneau River Subbasin has taken place concurrently with the development of the TMDL. The Basin Advisory Group (BAG) will also provide input into the Bruneau River SBA-TMDL until a functional WAG can be developed.

The Southwest Basin Advisory Group (BAG) provides guidance and advice to IDEQ in the final development of SBAs and TMDLs in the Southwest Basin. Part of this assistance consists of review of the document after formal presentation and providing comments and assistance. The SBA-TMDL was presented to this group on November 2, 2000.

Following public announcements, meetings were held in the Bruneau subbasin to relay progress of the SBA and TMDL process. The first of these meeting was held in the city of Bruneau in February 1999. The Bruneau River area group has not undergone any formal recognition by the BAG and has not undertaken any formal organization into a Watershed Advisory Group (WAG). The group has preferred to stay informal and to use the Soil Conservation District (SCD) as a platform for organization. The group has also decided to provide comments on the progress of the SBA-TMDL through the SCD. Additionally, interested residents from the Three Creek area have met with IDEQ and have been presented information regarding progress and status of the SBA-TMDL.

Local conservation districts began organizing in Idaho in 1940, and are legal subdivisions of state government whose volunteer district supervisors are locally elected. The district supervisors have encouraged participation from their constituents in the Bruneau River SBA-TMDL activities. A single district is within the area of the SBA.

Organized in 1953, the Bruneau River SCD covers approximately 3,000,000 acres in eastern Owyhee County. The main goal of the SCD at that time was to assist each operator in the district with the development of a soil and water conservation plan for his or her operations. The SCD currently has placed irrigation water management, rangeland management, animal waste management, and protection of wildlife habitat as high priorities in its long-range resources conservation program (McBride 2000).

2.1 Characterization of the Watershed

The characterization of the Bruneau River Subbasin will be based on its physical and biological features and how they interplay with the ecoregional and hydrological traits. The Bruneau River Subbasin is complex in its characterization, principally due to a dichotomy of land types within the Idaho portion of the subbasin. The dry, open, and highly accessible plateaus are contrasted by the confined and relatively inaccessible canyons through which the majority of water in the subbasin flows. Additionally, the source for much of the water in the subbasin comes from snowpack and rainfall in the mountain ranges in Nevada to the south. An additional portion of the subbasin complexity is the issue of nonpoint source pollution within the waterbodies, which is affected by soil characteristics, climate, vegetation, topography, and human activities.

2.1.1 Subbasin General Characteristics

As defined by the fourth field HUC system, the Bruneau River Subbasin covers about 8546.96 km^2 in southwestern Idaho and northeastern Nevada and encompasses several water sources.

1. The springs, snowpack, and rainfall in the Jarbidge Mountains and Jarbidge Wilderness area are the major water sources for the Jarbidge river system. The headwaters to the Jarbidge River begin between Fox Creek Peak and Cougar Peak at approximately 2,900 m elevation. While the headwaters of the East Fork of the Jarbidge River begin near Slide Rock Ridge to the north of Mary's River Peak at an elevation of 3,220 m. Both the Jarbidge River and the East Fork of the Jarbidge River enter Idaho at an elevation of approximately 1,640 m.

2. The Bruneau River system begins in a high desert basin bounded by Coyote Mountain (2,201 m elevation) to the east, Mason Mountain (2,277 m) to the west, and Lookout Mountain (2,085 m) to the south. It is formed by springs, snowpack, and rainfall in this area as well as from the Copper Mountains to the east and The Mahoganies to the west. The Bruneau River enters Idaho at an elevation of approximately 1,480 m.

3. Desert tributaries, in general, are the final source of water to the Bruneau River Subbasin. Most of the tributaries are formed on the plateaus and drop steeply in their final few kilometers before their confluence with the major rivers. For example, Deadwood Creek drops over 80 m in the final 3.62 km before it joins the East Fork of the Bruneau River (Clover Creek). Others, such as Mary's Creek drop 160 m in 3.22 km prior to joining Sheep Creek. The majority of these desert tributaries are ephemeral. In the lower elevations of the subbasin, numerous hot springs emerge (Figure 4).

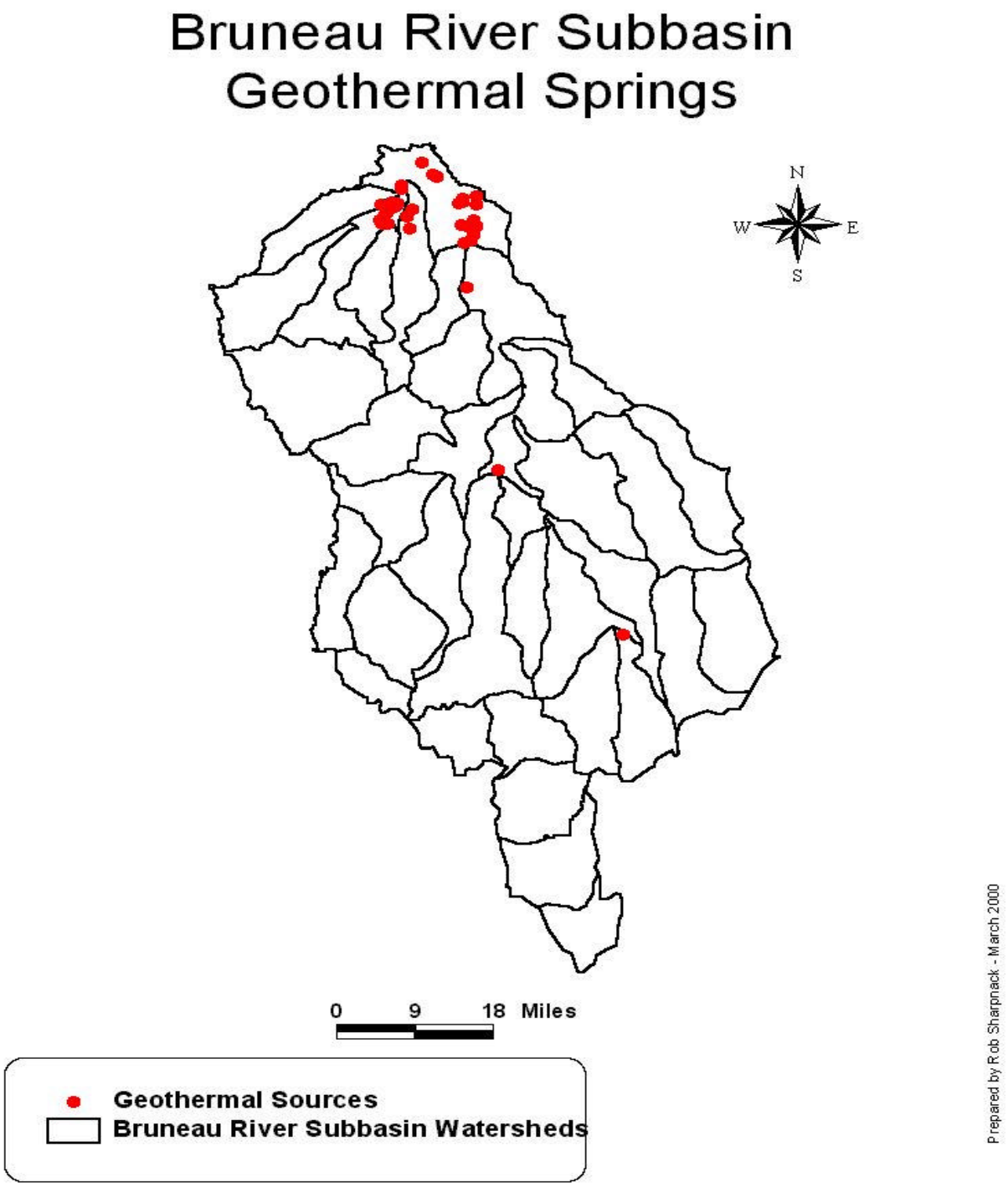


Figure 4. Geothermal Springs of the Bruneau River Subbasin.

Limited hydrologic modifications of the tributaries and of the mainstem rivers has occurred over the past several decades. These modifications include irrigation withdrawals and temporary storage structures designed to capture storm event runoff. This is most prominent in the tributary streams originating on the open plateaus. Many streams and tributaries in these areas contribute very little perennial surface flow to the mainstem rivers in this subbasin. However, intermittent and ephemeral channels proliferate in the area and impact the water quantity and quality of the mainstem rivers to an unknown extent. In addition, some losses of groundwater recharge via headcutting and the resulting loss of bank storage capabilities may have occurred in some of the perennial streams.

For these reasons, the application of the Clean Water Act in the Bruneau River Watershed is a matter of assessing the condition of the perennial stream and river systems. The conditions would be assessed under differing seasonally-influenced hydrological regimes to determine the critical periods for a river. The ephemeral and intermittent tributary creeks would then be assessed as separate entities. A final step would be to determine the effects the various thermal groundwater sources have on the rivers and streams.

2.1.1.1 Watershed Morphometry

The region is cartographically covered by 1:24,000-scale and higher USGS topographic quadrangle maps. The total vertical relief in the area is 2,583 m, from an elevation of 720 m at CJ Strike Dam to 3,303 m in the Jarbidge Mountains (Matterhorn Peak). Locally, slopes on the plateaus are usually quite gentle (although overall relief to the canyons is considerable), with considerably steeper slopes in the mountains.

The topography is chiefly an expression of the geologic structure and historical entrenchment processes. The faulted, linear mountain chains of the Basin and Range ecoregion border the Snake River Basin Plain to the south. The subbasin slopes from the south to the Snake River, which forms the northern border. The plateau areas of the subbasin generally are expanses of unintegrated depressions, low volcanic plateaus, and rough, irregular basalt flows. As stated previously; however, the area contains many intermittent and ephemeral stream systems.

The Snake River borders the subbasin on the north and has entrenched to varying depths. The Bruneau and Jarbidge rivers bisect the subbasin and flow through entrenched gorges of various depths. Small alluvial terraces rise above the rivers in limited locations. These; however, are restricted to open areas within the canyons due to the confinement of the river system within the entrenched canyons.

As stated previously the Bruneau River Subbasin covers approximately 8,546.96 km^2 in total area. Nearly 6,475 km^2, or 76 percent of the subbasin, is within the state of Idaho. The elevation range within the Idaho portion of the subbasin is from 800 to 2,300 m. The average elevation of the entire subbasin is approximately 1,470-1,770 m. The entire subbasin slope range is from less than 1 percent to 46 percent. Average subbasin slope is approximately 4 to 7 percent. Generally, the plateaus have slopes of less than 5 percent, while the river canyons and the area of the subbasin in Nevada have slopes greater than 5 percent. Overall, the subbasin has a northwest aspect. The stream channels and mainstem rivers follow a dendritic drainage pattern throughout the subbasin. In the subbasin, there are 1586.81 km of perennial streams; 4,842.52 km of ephemeral and intermittent streams; and 75.64 km of canals and ditches (Table 4). Roughly 51 percent of the perennial streams are located below 1828 meter elevation, which corresponds with the area of the subbasin located within Idaho. Approximately 83 percent of the intermittent and ephemeral streams are located in this same area.

Table 4. ELEVATION RANGES OF THE DIFFERENT WATER BODY TYPES IN THE BRUNEAU RIVER SUBBASIN

Elevation Range (meters)	609.6-914.4	914.4-1219.2	1219.2-1524	1524-1828.8	1828.8-2133.6	2133.6-2438.4	2438.4-2743.2	2743.2-3048	Subbasin Total km
Water Body Type	**Kilometers**								
Ditch	35.1	0.00	0.00	36.97	4.54	0.00	0.00	0.00	76.60
Intermittent	199.51	582.74	1361.12	1894.23	669.1	120.46	12.07	3.57	4842.81
Intermittent Shoreline	0.53	2.22	12.60	17.96	3.83	0.00	0.00	0.00	37.14
Shoreline	28.39	0.00	3.44	13.58	19.60	0.00	0.00	0.00	65.02
Stream	71.62	111.56	230.01	400.34	532.40	195.25	41.70	3.51	1586.38
Total	335.15	696.52	1607.17	2363.08	1229.47	315.71	53.77	7.08	6607.95

2.1.1.2 Wetlands/Riparian Areas

Wetlands and riparian areas are very limited throughout the subbasin. These areas are restricted to the canyon bottoms and along the perennial stream systems. Overall, riparian areas make up only 6.47 percent of the Idaho portion of the subbasin.

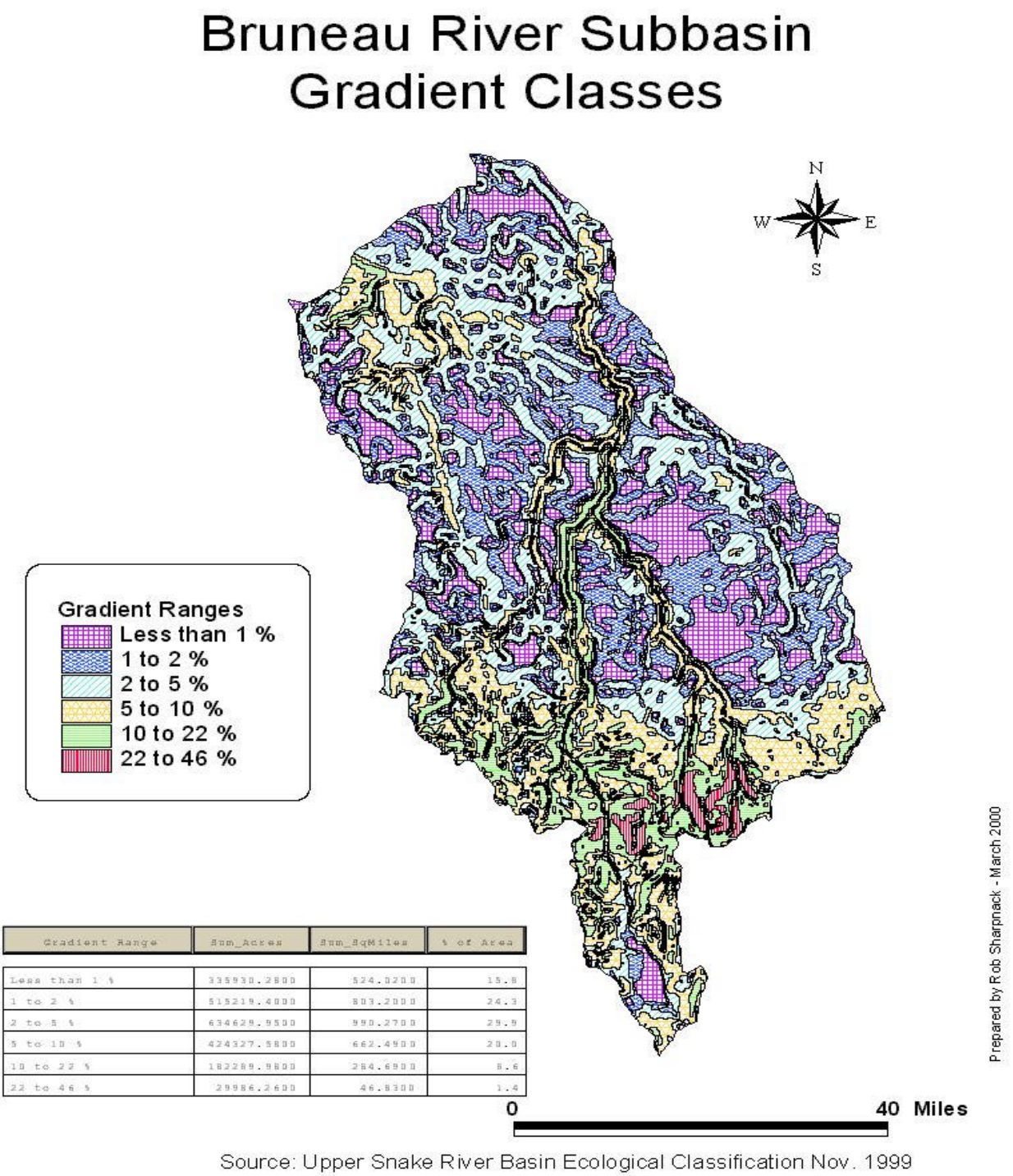
2.1.1.3 Soils/Geology

Local soils can be conceptualized as four soil provinces: the clayey and loamy soils of plateaus, the loamy soils of the fluvial canyons, the highly stratified alluvial soils of the area near the town of Bruneau, and the alpine glacial soils of the Jarbidge mountain province.

The average soil slope provides a gage of potential soil erosion, or risk erodibility. The topographic maps show that slopes are low (0-5 percent) on the plateaus, moderately steeper in the valleys and canyons (5-22 percent), and slopes increase appreciably as one approaches the bordering mountain ranges. The slopes are fairly steep in the mountain ranges, ranging from 10-46 percent (Figure 5.).

The "K-factor" is the soil erodibility factor in the Universal Soil Loss Equation (Wischmeier and Smith 1965). The factor is comprised of four soil properties: texture, organic matter content, soil structure, and permeability. The K-factor values range from 1.0 (most erosive) to 0 (nearly non-erosive). From the Owyhee county soil survey, K-factors on the flat slopes of the plateau soils range from 0.10 to 0.49. However, many of the soil types in this area (namely, soil types Wickahoney, Monasterio, Hat, Clevage, Longcreek, Willhil, Dougal, Bruncan, and Troughs) have K-factors that range from 0.10 to 0.24. On the soils of the main agricultural areas, such as near the town of Bruneau and in the canyon bottoms, K-factors range from 0.15 in the Payncreek soils to 0.49 in the Arbidge and Badlands soils. On the steeper, but rocky, unweathered slopes of the mountains, the erosion potential is low, with K-factors ranging from 0.10 to 0.24. Data from USEPA's modeling tool BASINs calculated area weighted K-factors for the Bruneau subbasin (Figure 6).

In general, the K-factors indicate that the rangelands have low-to-moderate soil erosion potentials. Because of this, sediment sources from the rangelands are also low. Due to the low erosion potential from the uplands, this Bruneau Subbasin TMDL will focus on valley bottom and channel sources of sediment for those streams on the 1998 §303(d) list with sediment as a pollutant.



Gradient Range	Sum_Acres	Sum_SqMiles	% of Area
Less than 1 %	335930.2800	524.8200	15.8
1 to 2 %	515219.4000	803.2000	24.3
2 to 5 %	634629.9500	990.2700	29.9
5 to 10 %	424327.5800	662.4900	20.0
10 to 22 %	182289.9800	284.6900	8.6
22 to 46 %	29986.2600	46.8300	1.4

Figure 5. Gradient Classes of the Bruneau River Subbasin.

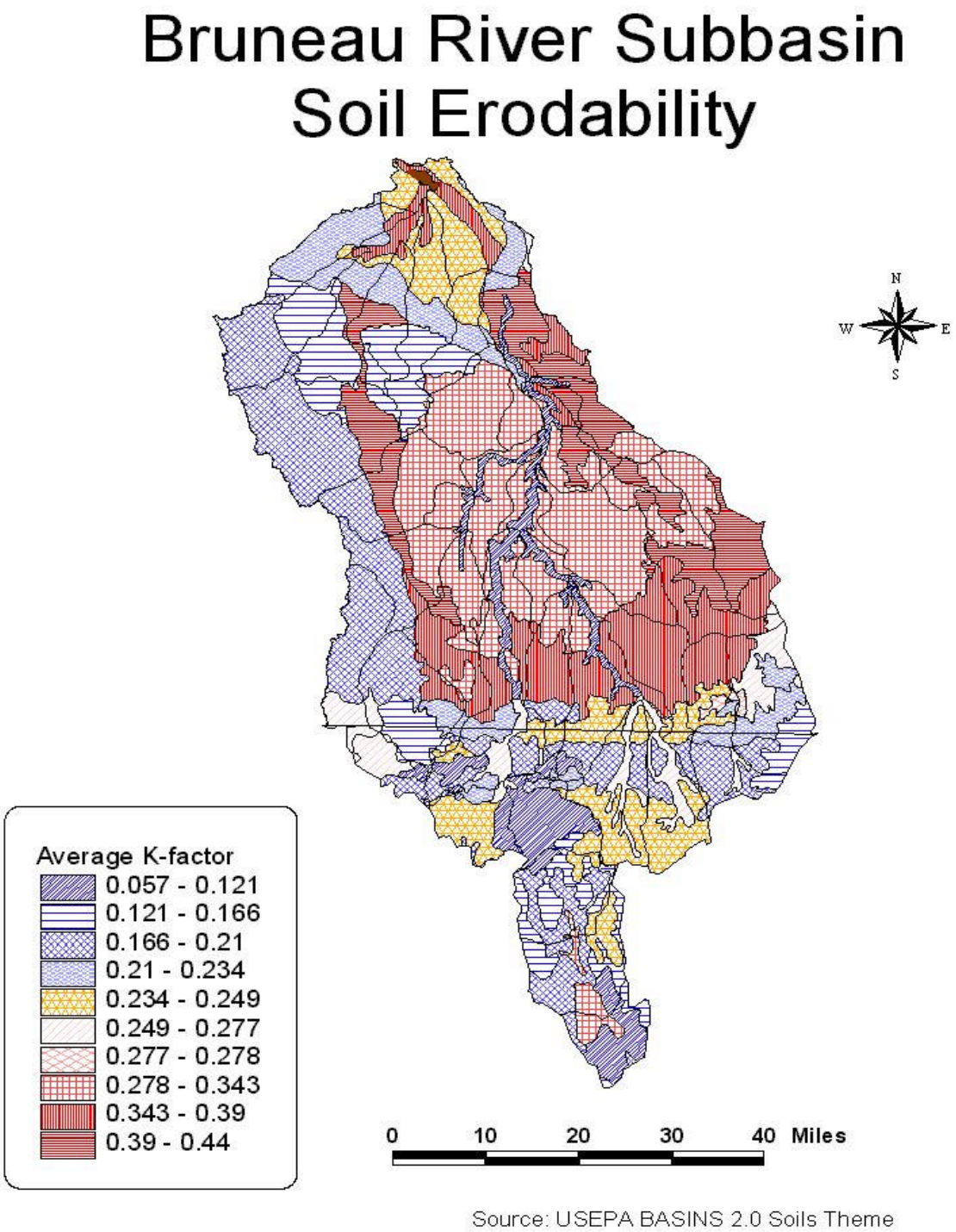


Figure 6. Average K-Factors of the Bruneau River Subbasin.

The overall geologic structure of the area is within the southern extent of the Snake River Plain Province. The Northern Basin and Range ecoregion crosscuts the basin in the south in Nevada. Locally thick deposits of loess (wind-blown silt) overlie these rocks, particularly in the volcanic Snake River Plain (Alt and Hyndman 1989). The Basin and Range is an area of faulted metamorphic and sedimentary rocks uplifted into mountains, separated by basins deeply filled with alluvium. The Snake River Plain is a deep, wide structural basin filled with a veneer of volcanic basalt deposits overlying rhyolite. The rocks decrease in age, from west to east, due to the migration of a magma source that has migrated to present-day Yellowstone National Park.

The geomorphology of the subbasin can be divided into seven geological subsections (Figure 7). Within each of these subsections, locally distinct geological formations can be found. The majority of the subbasin (75 percent including the Nevada portion) lies within the volcanic plateau subsection. Each geological subsection contributes sediment to the streams in various volumes. From Figures 5 and 7 it can be seen that the volcanic plateau subsection likely does not contribute significant sediment loads to the streams and rivers as its slopes are usually less than 5 percent.

2.1.1.4 Ecoregion/Vegetation

The Bruneau River Subbasin is predominantly within the Snake River Basin/High Desert ecological region (Figure 8), as described by Omernik and Gallant (1986) and Omernik (1986).

Most of the perennial streams in the ecoregion are large rivers originating in the adjacent mountainous ecoregion. The small mountain streams become intermittent at lower elevations predominantly due to evaporation and seepage, as well as irrigation and loss of bank storage. Scattered springs occur throughout the region, as do a moderate number of small reservoirs. A majority of the springs are geothermal in nature (see Figure 4).

Sagebrush/wheatgrass/needlegrass steppe is the dominant vegetation type throughout the region. Stands of juniper are also found in this area, as are large tracts of saltbush/greasewood. Some playas and recent lava flows are entirely devoid of vegetation. Streamside vegetation is generally the same as the surrounding regional vegetation due to the intermittent or ephemeral nature of most streams. Where perennial flow does occur, dense stands of sedges and forbs line the riparian zone. In perennial streams with moderate annual flow, woody vegetation consists of alder, willow, cottonwood, clematis, rose and mock orange.

Most of this region is used as rangeland. However, some areas within basins or bordering large streams are irrigated for pasture and production of potatoes, corn, alfalfa, sugar beets, mint, and grains. Where access by livestock is concentrated, loss or reduction of streamside vegetation is severe, causing stream bank erosion and sedimentation. Water withdrawal for irrigation often results in completely dry channels downstream from diversions.

Variability in the makeup of natural vegetation in the Bruneau River reach is minimal. Shrubland and grassland vegetation predominate the entire subbasin (96.6 percent in the Idaho portion) with limited riparian vegetation in the mainstem rivers (0.5 percent of the Idaho portion of the subbasin). Following the construction of irrigation canals and irrigation return drains, some of the natural sage-grass areas have been changed to support agricultural crops, pasture grasses and hay, and riparian vegetation.

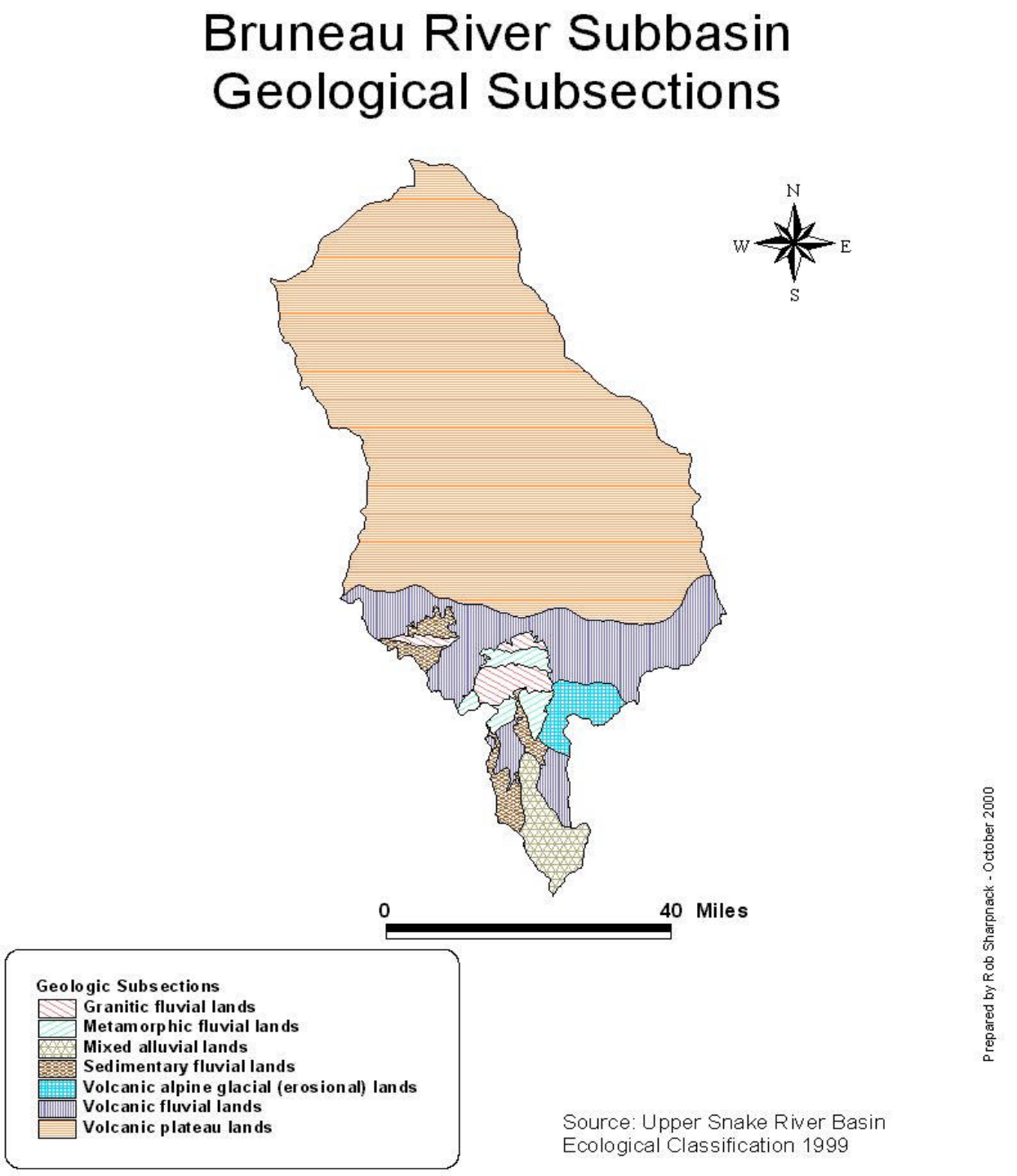


Figure 7. Geological formations of the Bruneau River Subbasin.

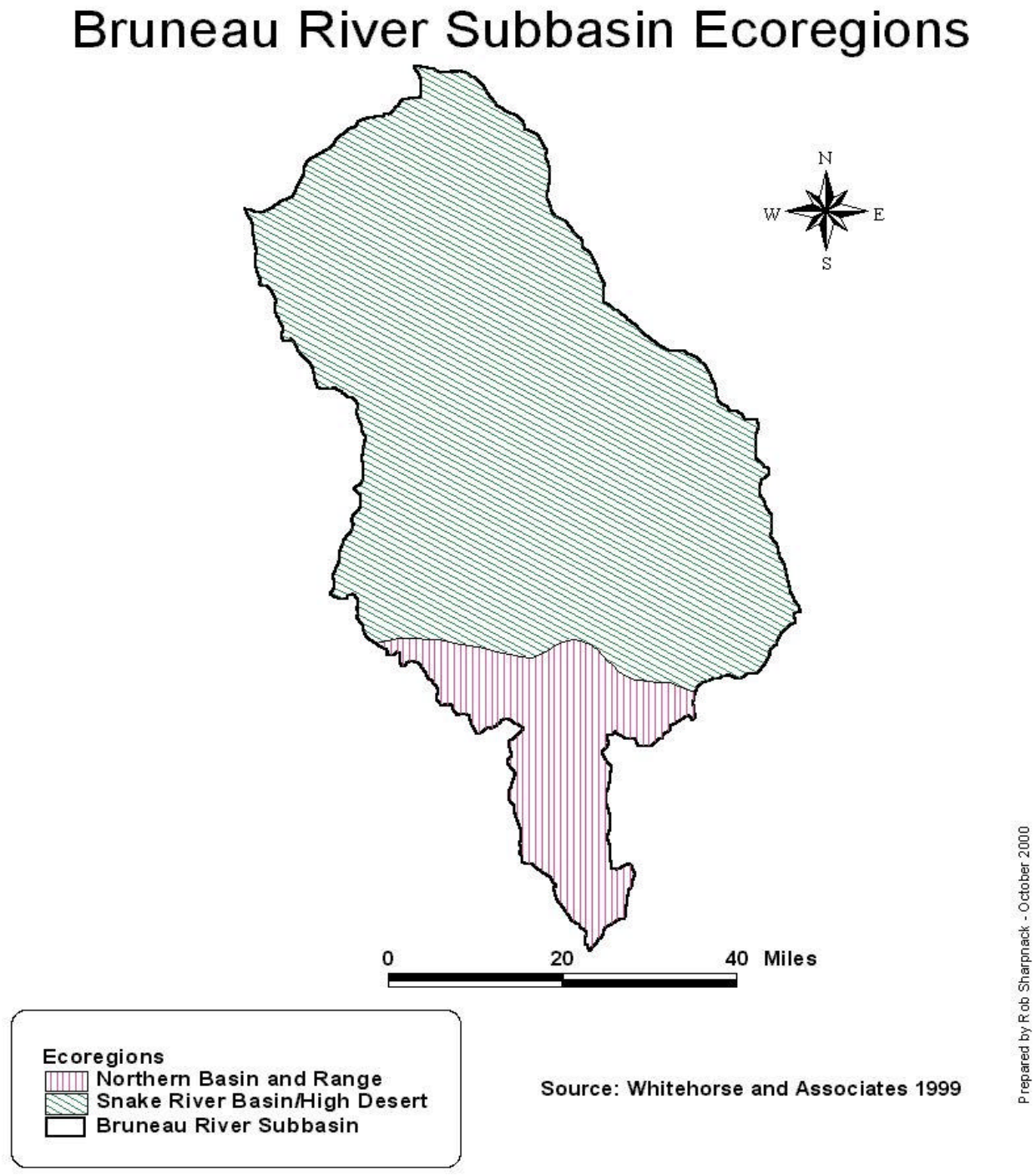


Figure 8. Ecoregions of the Bruneau River Subbasin.

2.1.1.5 Land Use and Ownership

As seen in Figures 9 and 10, and Table 5, more than 90 percent of the lands within the subbasin are used as rangelands. Nearly all the remaining lands are in the confined canyon bottoms, which are classified as riparian areas and water. A very small portion of the subbasin is used for cropland agriculture (2.8 percent), with most of this (63.21 percent) under sprinkler irrigation.

Table 5. LAND USE IN THE BRUNEAU RIVER SUBBASIN (USEPA 1998)

Land Use Type	Percent of Total Area
Range	90.6
Agricultural	2.8
Riparian/Water	6.6

The subbasin in Idaho lies entirely within Owyhee County. Privately owned lands (6.9 percent of the subbasin) are essentially the same lands that are used for agriculture. The majority of the remainder (84.3 percent of the subbasin) is managed by the USBLM. These are treeless rangelands. Scattered state endowment lands (sections 16 and 36), under the management of IDL comprise 5.5 percent of the subbasin. A small portion of the subbasin (1.6 percent) is a military reservation. Another small area in the southwestern portion (in Idaho) of the subbasin lands is part of the Duck Valley Reservation administered by the Shoshone-Piaute Tribe. Highway 51 is the main access through the subbasin. This highway crosses the northern-most portions of the subbasin and heads southbound down the western portion of the subbasin. The only other paved road in the subbasin is the Rogerson cutoff that connects the town of Rogerson and the Three Creek/Murphy Hot Springs area. The remainder of the subbasin is covered with numerous dirt and gravel roads, most of which are not maintained (see Figure 11).

2.1.1.6 Population

The population in Owyhee County was about 8,392 in 1990 (www.idoc.state.id.us 2000) and was estimated at 10,227 in 1998. The majority of the county population lives outside of the subbasin. For example, in 1998, the Homedale and Marsing populations were estimated at 3,311, most other towns were too small to be listed. The Bruneau SCD, which covers most of the subbasin, estimates the population of the district at 2,000 full time residents (McBride 2000). The largest municipality in the subbasin is the town of Bruneau. Other small towns include Grassmere, Three Creek, and Murphy Hot Springs (Figure 12). The underlying foundation for economic activity in the area is agriculture, which is mainly derived from ranching and farming.

Most of the initial agricultural activity in the area was ranching and grazing. Decreed surface water rights for irrigation in the Bruneau area began in 1875, while decreed stock watering rights began in 1860. In the Three Creek area, the first recorded stock water right was in 1871. In 1885, the first irrigation water right was filed.

Recreation is an important water-related industry of the Bruneau River and Jarbidge River reaches. These rivers provide for varied recreational experiences. Whitewater rafting and kayaking occur in the spring during high water. There are several rafting services in the town of Bruneau that ferry rafters to and from launching and takeout points.

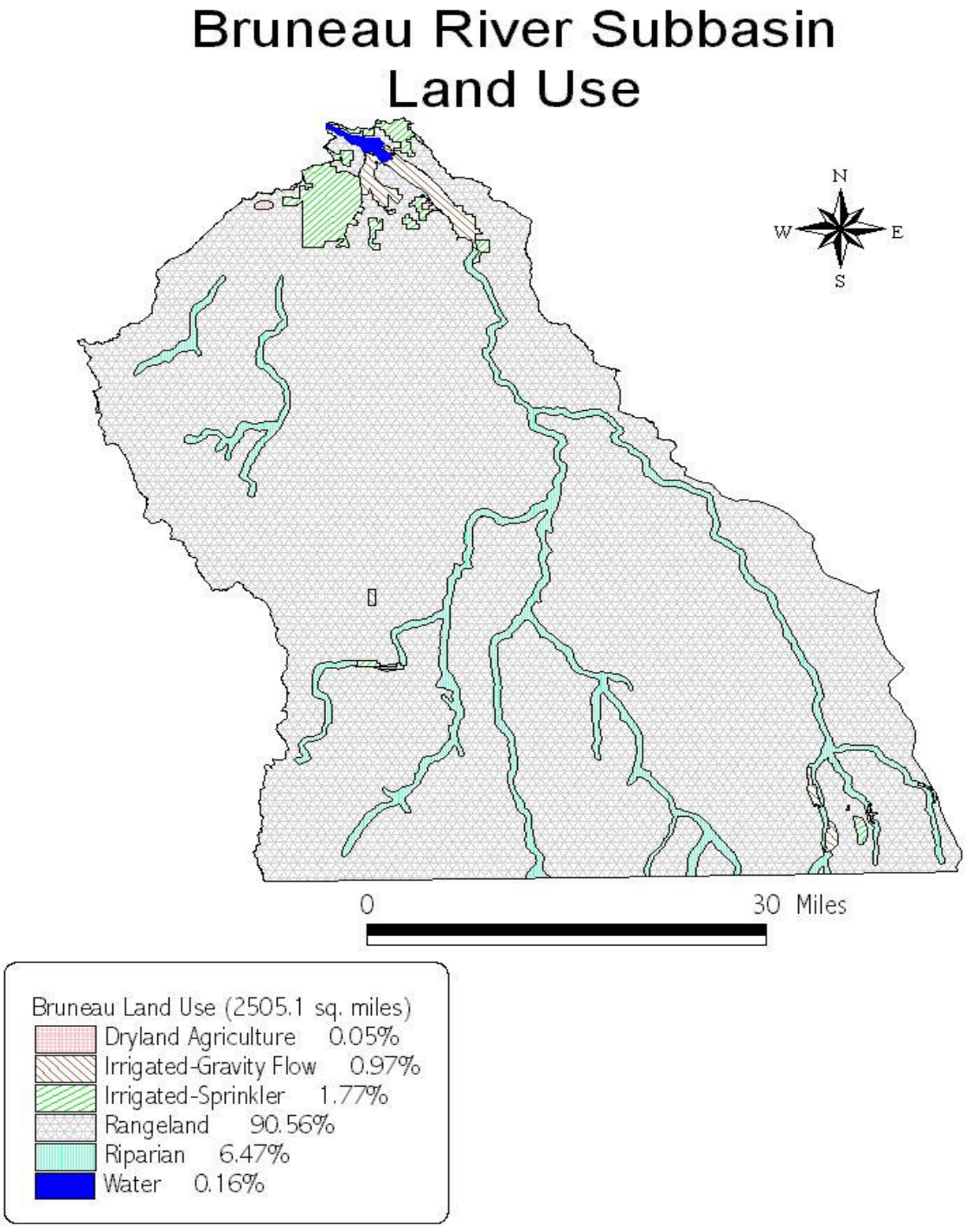


Figure 9. Land use of the Bruneau River Subbasin

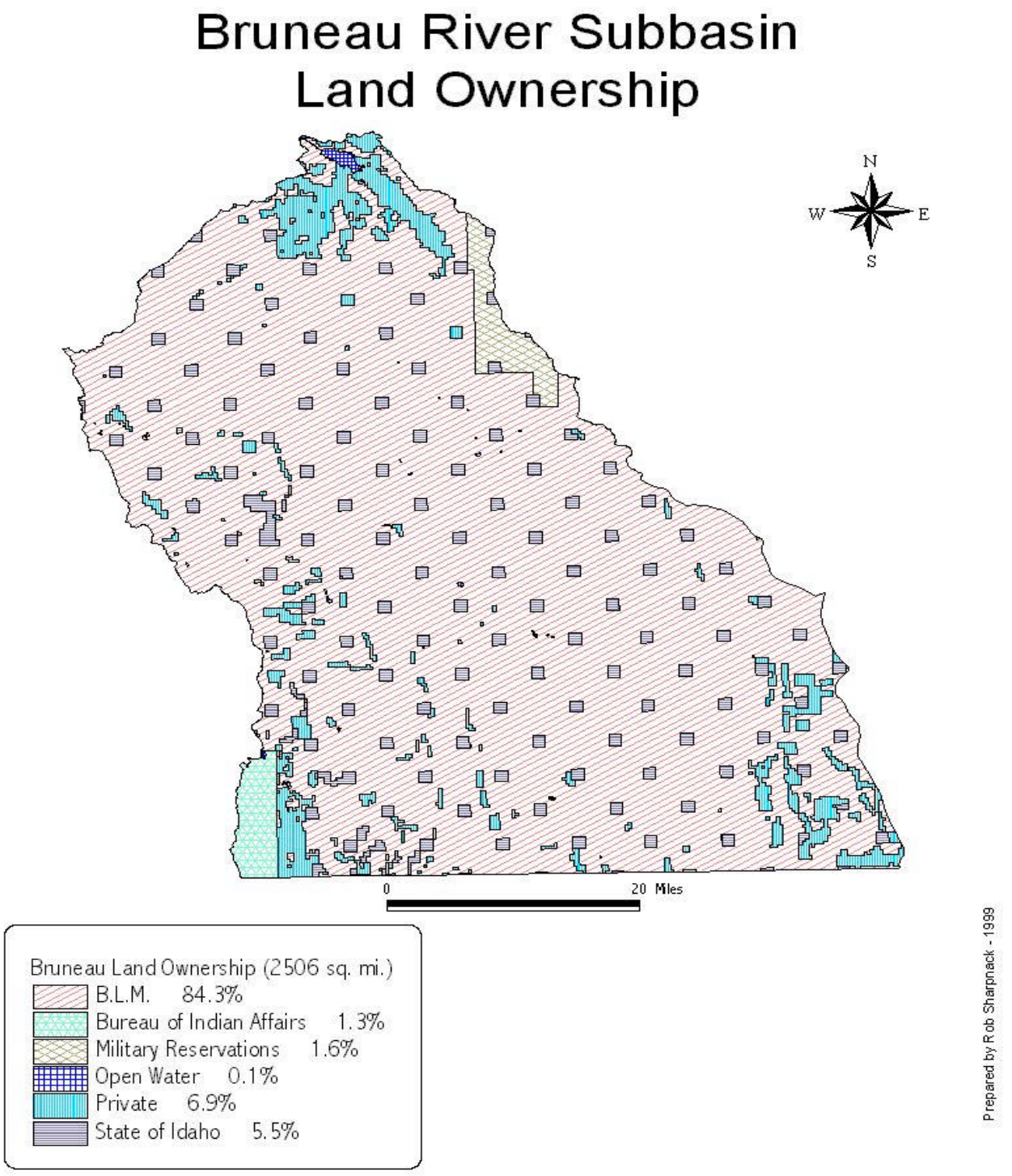


Figure 10. Land Ownership of the Bruneau River Subbasin

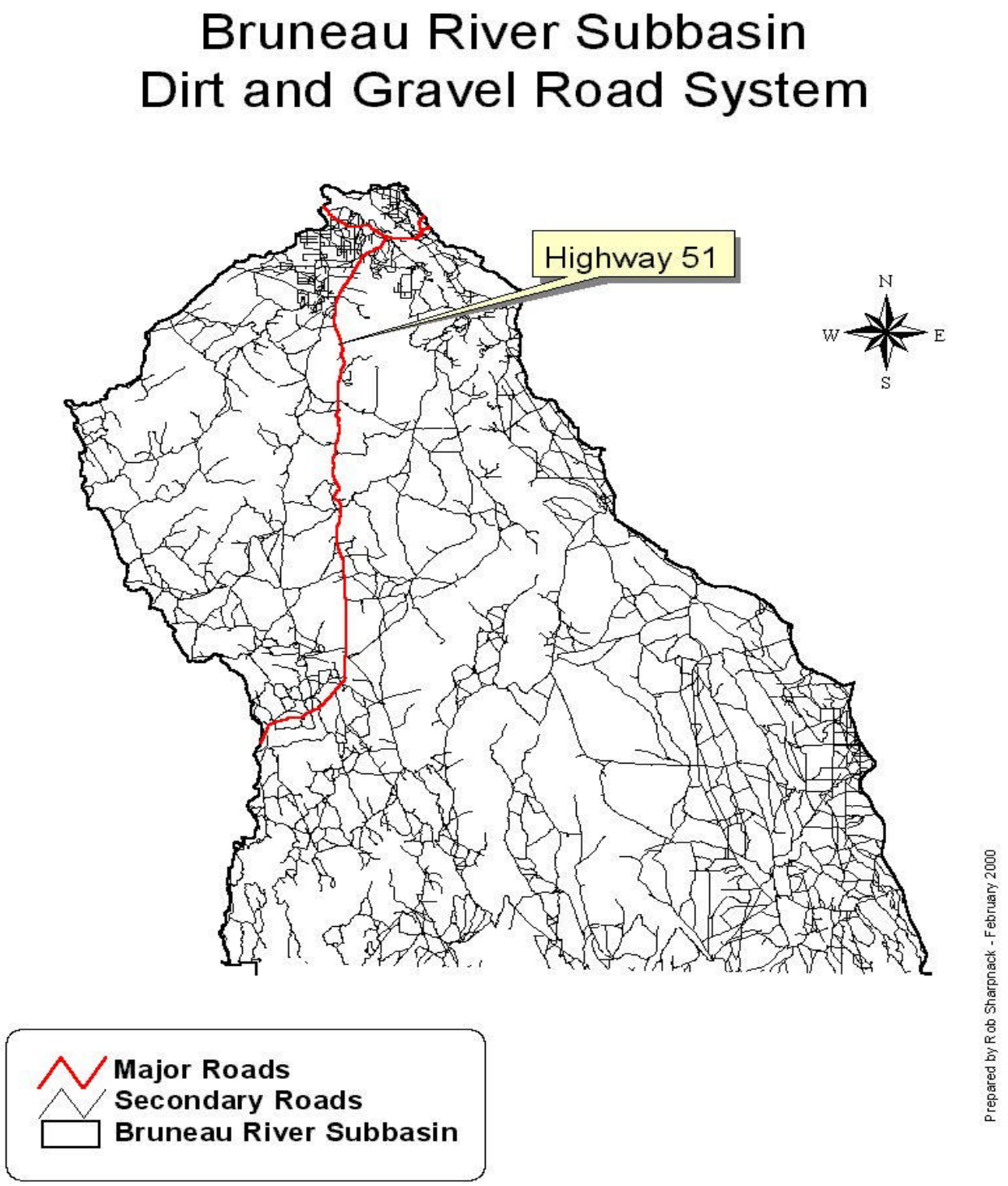


Figure 11. Dirt and Gravel Road System of the Bruneau River Subbasin.

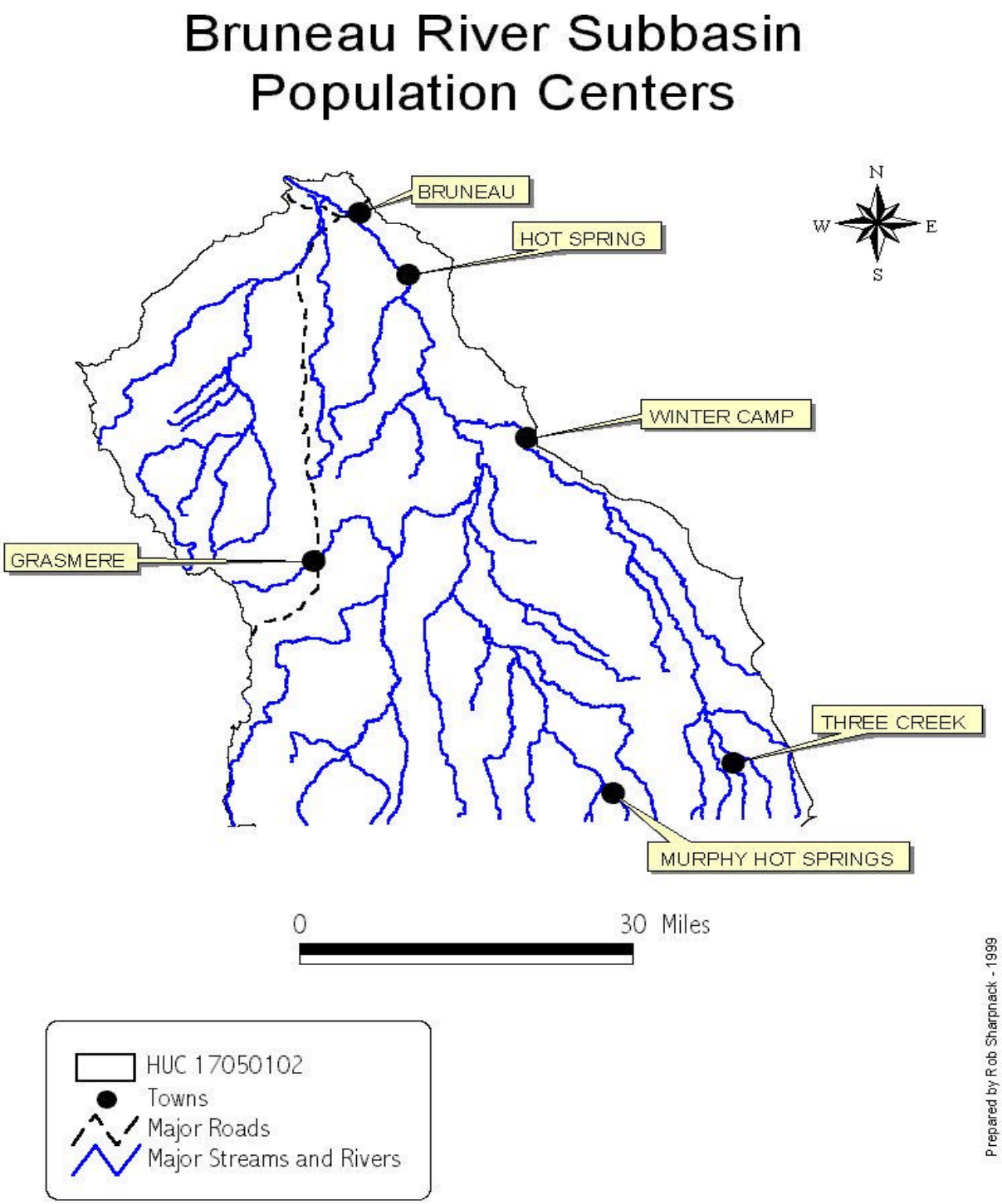


Figure 12. Population Centers of the Bruneau River Subbasin.

2.1.1.7 Climatology: Precipitation and Temperature

As stated previously, the subbasin begins in the high mountains of the Northern Basin and Range geologic province to the south and reaches northward to the lowlands of the Snake River Basin High Desert. Because of the elevation difference across the subbasin, there are pronounced differences in climate from the Snake River Plain to the mountains. Precipitation varies from 8 to 9 inches/year on the lower elevations of the Snake River Plain to 22 to 42 inches/year on the mountain summits (Figure 13). Using the Koeppen system of climate classification, the plains would be classified as BSk or "cold steppes" and the mountains as "undifferentiated highland climates."

Only two climate stations from the Western Regional Climate Center (www.wrcc.dri.edu 2000) are available to characterize the watershed. These are Bruneau and Three Creek. A third, Grassmere, is not available at this time. As a result, there are few data sets available for the bulk of the middle section of the subbasin. As noted, nearly all the perennial flow in this watershed comes from the mountains to the south of the Snake River Plain which do not have climate station data.

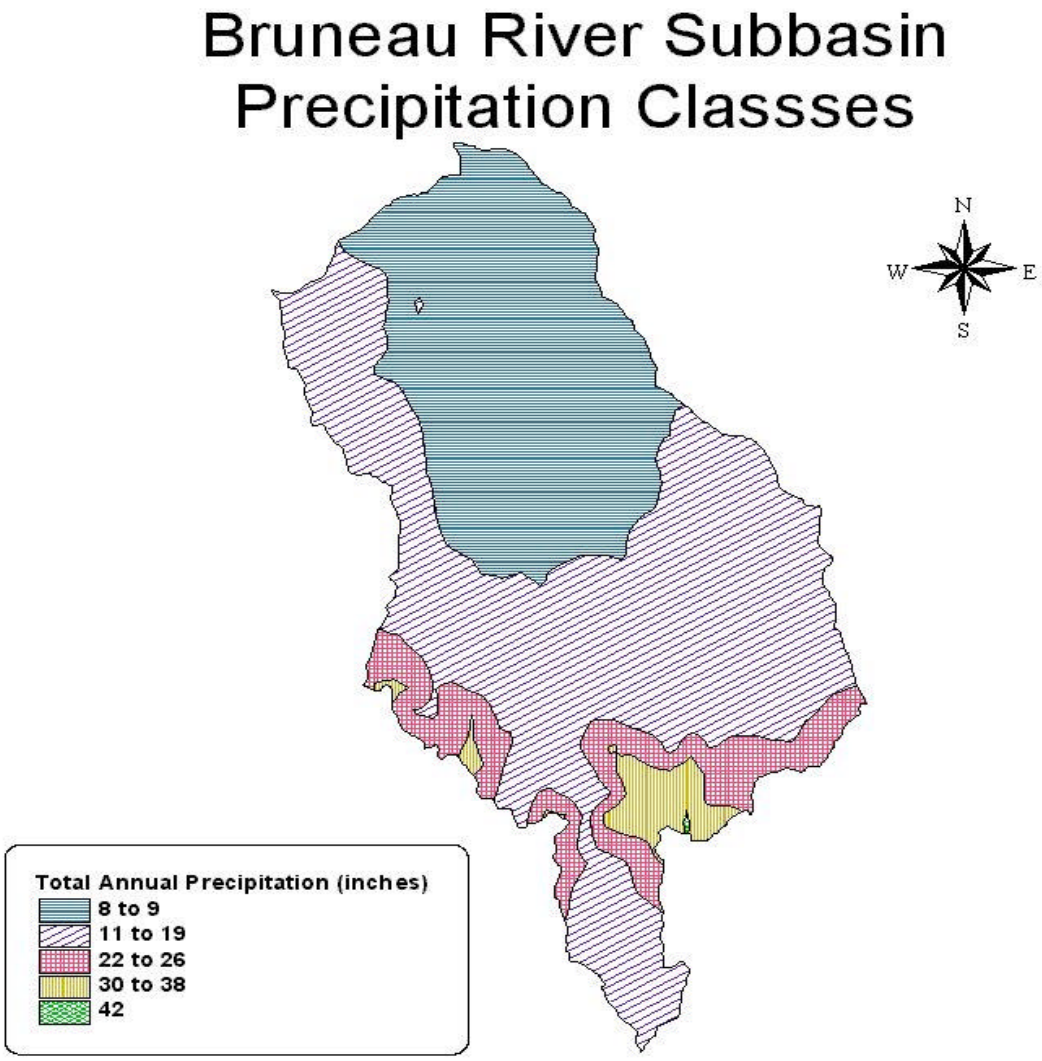
The town of Bruneau is in the southwestern portion of the Snake River Plain at approximately 771 m elevation. The climate is arid with an annual precipitation of 19.28 cm. Over one-fourth the precipitation falls as snow in November to March. Average snow depths in these months is zero, indicating that most precipitation in the form of snow does not accumulate to provide for a spring snowmelt runoff. The wettest months of the year are November and January (2.51and 2.29 cm respectively), while the driest months are July through October (0.46 to 1.24 cm). For the remainder of the year, the mean precipitation is evenly distributed at approximately 1.79 cm a month. The annual temperature is 11.39 $^{\circ}$C, with average winter temperatures of 0.83 $^{\circ}$C, and average summer temperatures of 22.28 $^{\circ}$C.

The town of Grassmere is approximately 64 km south and west of Bruneau in the Snake River plain ecoregion. Grassmere lies at an elevation of 1,563.62 m. It is an arid climate, with an annual mean precipitation of approximately 20-23 cm. The annual temperature is between 7.33 and 9.66°C, with cool winters and warm summers (Figures 14 and 15)

The third permanent weather station is located at Three Creek, and is the closest station to the mountainous area. It lies at the edge of the Snake River Plain at an elevation of 1,652 m. The area is semi-arid with an annual mean precipitation of 32.84 cm, about a third of this as snow. Average snow depths in the winter months ranges from 7.62 to 10.16 cm, indicating that some precipitation in the form of snow accumulates to provide for a spring snowmelt runoff. The wettest months of the year are May and June (4.65 and 4.47cm respectively), while the driest months are July and August (1.32 and 1.4 cm). For the remainder of the year, the mean precipitation is evenly distributed at around 2.54 cm a month. The annual temperature is 6.33°C, with average winter temperatures of –2.33 $^{\circ}$C and average summer temperatures of 15.94 $^{\circ}$C.

2.1.2 Subbasin Hydrology

Generally, the natural hydrology of an area is related to its climactic regime, topography, and geology. Water in the Bruneau River Subbasin moves through a variety of pathways, dominated by the Bruneau River and Jarbidge River routes. Except for the two mountainous southern drainages, most of the surface channels are intermittent or ephemeral tributaries. Seasonally, groundwater plays an unknown but significant role in the hydrology of several streams and rivers of the subbasin.

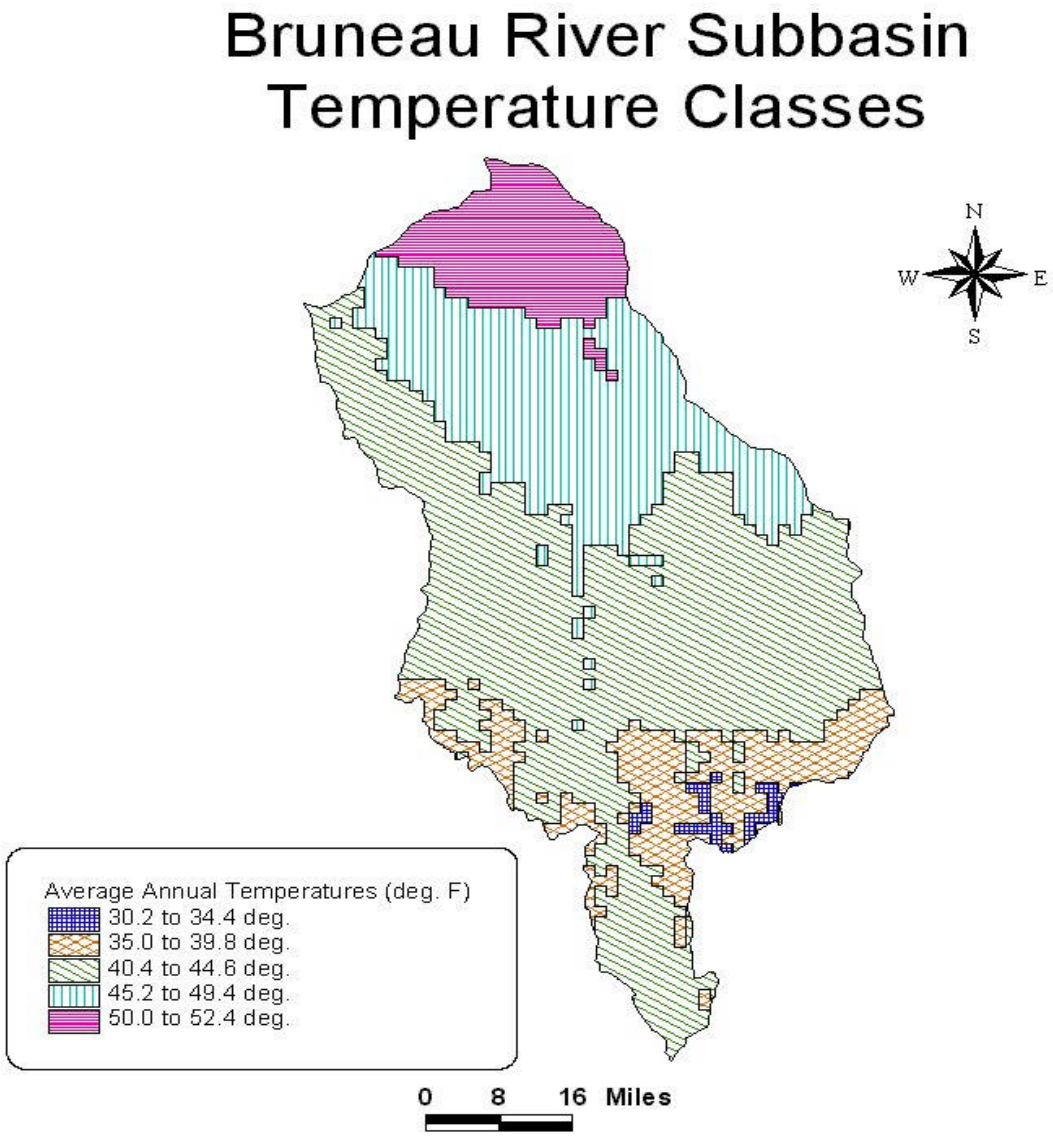


Precip. (in	Acres	Square Mil	% of Area
8 to 9	736362.540	1150.560	34.7
11 to 19	1095828.350	1712.220	51.6
22 to 26	221841.480	346.630	10.5
30 to 38	67611.070	105.630	3.2
42	737.620	1.150	0.0

Prepared by Rob Sharpnack - March 2000

Source: Upper Snake Basin Ecological Classification Nov. 1999

Figure 13. Annual Precipitation Ranges of the Bruneau River Subbasin.



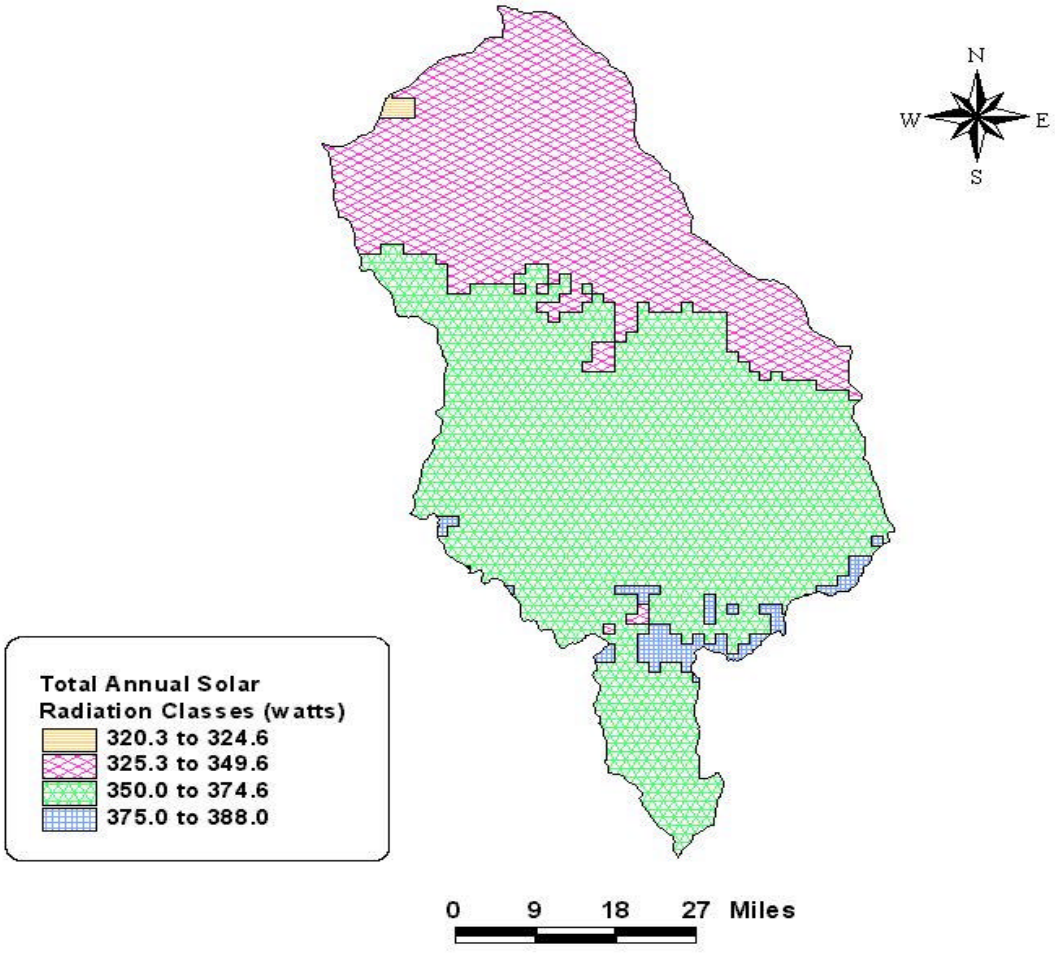
Classes	Acres	Square Miles	% of Area
30.2 - 34.4	25575.8700	39.8900	1.2
35.0 - 39.8	246283.6200	384.4800	11.6
40.4 - 44.6	1116752.1000	1744.4200	52.6
45.2 - 49.4	524709.8200	819.6000	24.7
50.0 - 52.4	209070.7400	325.6300	9.9

Prepared by Rob Sharpnack - March 2000

Source: Upper Snake Basin Ecological Classification Nov. 1999

Figure 14. Average Annual Temperature Ranges of the Bruneau River Subbasin.

Bruneau River Subbasin
Solar Radiation Classses



Class	Acres	Square Miles	% of Area
320.3 to 324.6	5742.4400	8.9500	0.3
325.3 to 349.6	772232.3200	1204.8000	36.4
350.0 to 374.6	1290141.6100	2012.6700	60.8
375.0 to 388.0	54274.9900	84.6300	2.6

Prepared by Rob Sharpnack - March 2000

Source: Upper Snake Basin Ecological Classification Nov. 1999

Figure 15. Total Annual Solar Radiation of the Bruneau River Subbasin.

2.1.2.1 Bruneau River

The Bruneau River begins in the northeastern mountains of Nevada and flows to the confluence of the Snake River at CJ Strike Reservoir (see section 2.1.1). Throughout its 133.58 kilometer length (Idaho portion), three perennial tributaries (Sheep Creek, Jarbidge River, and Clover Creek) enter the system as do numerous intermittent and ephemeral systems. Three gauge locations can be found on the Bruneau River in Idaho. The upstream most of these locations is the gauge near Tindall, Idaho. The Tindall gauge was in operation from August 1910, until May 1912, with a contributing watershed area of 1139.6 km^2. Given this size watershed, channel characteristics can be extrapolated from regional curves. These regional curves can be found in the book *Applied River Morphology* (Rosgen 1996). Extrapolating from the regional curve, the Bruneau River at this sampling location would have a mean depth of 1.07 m, a bank full width of 24.38 m and a cross sectional area of approximately 27.87 m^2. From the historical gauge data, period of record average discharge at this location was 3.35 cubic meters per second (cms). Low discharge occurred during the fall quarter with only 0.70 cms. Spring discharge was 8.58 cms, while winter base discharge was 1.48 cms. Summer discharge was 2.30 cms.

The next gauge was located near Winter Camp Ranch. The period of record for this gauge was from November 1946 to September 1951. The watershed area for this gauge was 4,895 km^2. The average discharge at this gauge was 9.94 cms. The lowest average discharge occurred again in the fall at 1.80 cms. Winter base discharge averaged 3.94 cms, while during the summer the average discharge was 12.98 cms.

The final gauge location is near Hot Springs, Idaho. This location is also the beginning of the 23.24 km long §303(d) listed section of the Bruneau River. Additionally, this gauge is the only active gauge on the Bruneau River in Idaho. The period of record for this gauge is from July 1909 to February 1915 and from October 1943 to September 1998. The drainage area of the contributing watershed is 6811.68 km^2. The average discharge is 10.98 cms. Average spring discharge is 23.35 cms. Winter discharge averages 4.73 cms. Low discharge occurs in the fall and averages 2.88 cms (Figure 16).

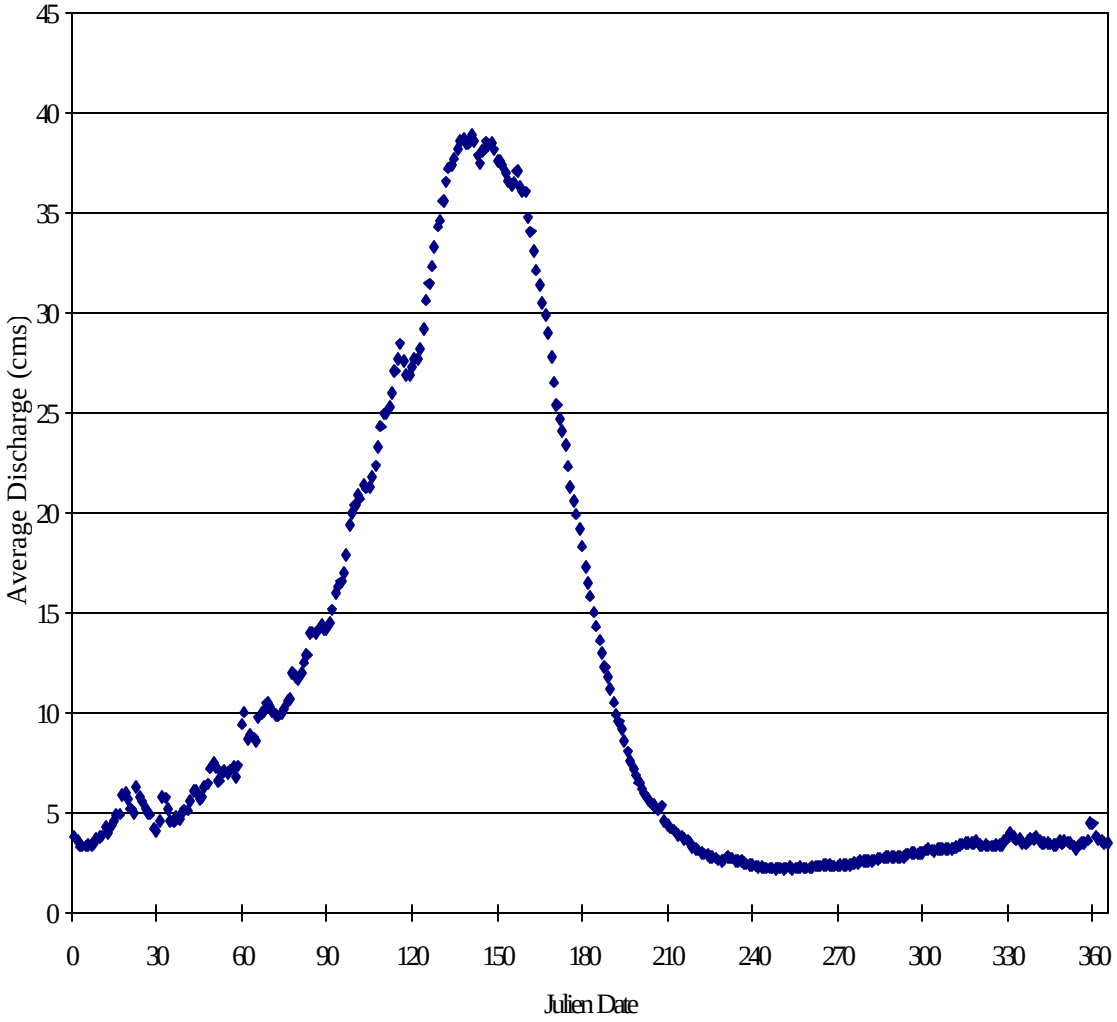


Figure 16. Daily Average Discharge for the Bruneau River, Hot Springs, Idaho Gauge.

It is unknown at this time as to the quantity of groundwater interchange in the area between the Hot Springs gauge and the mouth of the river. This area of the Bruneau River overlies the Bruneau-Grandview aquifer, so interchange to and from the river with geothermal waters does occur. Public comments received during presentations in the Bruneau area indicate that at times of the year the majority of discharge in the river is from the geothermal sources. It was indicated that geothermal waters from springs in the river near Hot Springs and large springs further up the Bruneau River canyon make up a large part of the discharge. A strong seasonal component was also indicated. Snowmelt and other runoff events in the early spring cool the river. By late spring through early fall the springs are responsible for a greater percentage of the discharge. The river is again cooled by early winter storms and runoff events.

2.1.2.2 Jacks Creek

Jacks Creek begins at the confluence of Big Jacks Creek and Little Jacks Creek. The creek is 19.81 km in length. No perennial streams enter Jacks Creek below the confluence of Big and Little Jacks Creeks. The Sugar Valley Wash, an ephemeral stream, joins Jacks Creek approximately 3.22 km above the mouth of Jacks Creeks. Jacks Creek itself is not gauged, but two gauges can be found at or near the mouths of the tributaries Big and Little Jacks Creek. Two final sources of water add to the discharge in Jacks Creek to an unknown extent. These sources are hot spring water effluent from a warm water fish hatchery and agriculture wastewater from field runoff and flowing wells. Water from these sources enters Jacks creek beginning approximately 8.05 km from the mouth. In many cases, the runoff from the agricultural fields is from geothermal wells used for irrigation. For example, a farmer in the Jacks Creek drainage noted that water from his irrigation well was applied to his fields at or near 41EC.

The upper 11.27 km of Jacks Creek is also dry for most of the year as can be seen by looking at the Big Jacks Creek Gauge data. The Big Jacks gauge period of record runs from 1938 to 1949 and from 1966 to 1998. The contributing watershed is 655.27 km^2. During the period of record, the average discharge was 0.14 cms and the average spring discharge was 0.37 cms. Winter discharge averaged 0.11 cms while summer discharge averaged 0.06 cms. Low discharge occurs in the fall and averaged 0.03 cms. The gauge was also prone to long periods of zero discharge (Figure 17). For example, in water year 1998, Big Jacks Creek was dry from October 1, 1997 until January 12, 1998, from January 22 until March 16, 1998 and from July 16 to September 5, 1998.

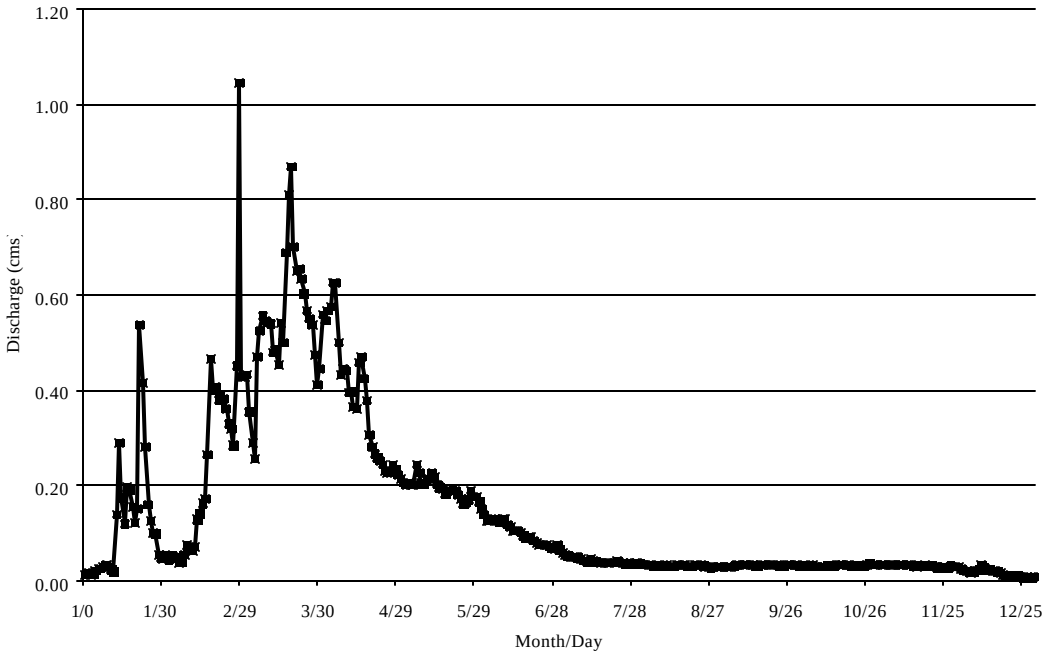


Figure 17. Daily Average Discharge in Jacks Creek.

2.1.2.3 Sugar Creek

Sugar Creek is an ephemeral stream in the western side of the Bruneau subbasin. It is often confused with Sugar Valley Wash, as is the case with the boundaries for Sugar Creek on the 1996 and 1998 §303(d) lists. These lists have included both Sugar Creek and Sugar Valley Wash for a cumulative length of 58.48 km. Sugar Creek begins approximately 14.5 km away from the town of Grassmere near Highway 51 at an elevation of approximately 1,524 m. In this area it is simply an unintegrated wash through which precipitation events may contribute water. Sugar Creek continues through the Big Hill and Table Butte area roughly paralleling Highway 51. Sugar Creek terminates approximately 1.2 km from the headwaters of Sugar Valley Wash. The terminus is at an elevation of approximately 869 m in a stock-watering pond or flood control structure that is less than an acre in size. A USGS gauge identified as being on Sugar Creek measured peak flows for ten years. During this period, eight of the ten years had a peak flow of 0.0 cms. The remaining two years' peak flows were 36.81 cms and 4.30 cms. Sugar Creek was surveyed in summers of 1997 and 1998 by the BURP crew of the IDEQ-TFRO. At those times Sugar Creek was found dry. In addition, Sugar Valley Wash was visited by the IDEQ-BRO BURP crew in the summer of 1995. At that time, Sugar Valley Wash was determined to be dry as well. At the end of April 2000, IDEQ-TFRO personnel also determined that Sugar Creek was dry and that Sugar Valley Wash had a discharge of 0.01 cms. The source of this water is likely a flowing well identified on the USBLM 1:100,000 scale map of the area. Sugar Valley wash falls within the watershed of Jacks Creek and as a result will be incorporated into the Jacks Creek TMDLs via the river corridor approach and allocations based upon land use/land area within the Jacks Creek watershed. Furthermore it should be noted that Sugar Creek was listed in error. However, the original intent of the §303(d) listing has been lost. IDEQ assumes that the original listing was meant to cover Sugar Valley Wash an ephemeral tributary to Jacks Creek. Therefore, IDEQ proposes to correct the §303(d) list by removing the Sugar Creek segment while retaining the Sugar Valley Wash Segment on the §303(d) list. It is IDEQ's opinion that Sugar Valley Wash, although on the §303(d) list, does not belong there. However, as the wash falls within the corridor of Jacks Creek, it can be included into the allocation scheme of the Jacks Creek TMDL and BMPs applied to restore beneficial uses to Jacks Creek and any that might apply to Sugar Valley Wash through the implementation plans for the Jacks Creek TMDLs.

2.1.2.4 Wickahoney Creek

Wickahoney Creek is an ungauged stream in the western side of the Bruneau subbasin. A determination of the perennial status has not been made as of yet. Wickahoney begins at an elevation of 1,798 m below Horseshoe Reservoir. The creek is intermittent until it nears the old town site of Wickahoney. A spring approximately 0.5 km above the town flows approximately 1.6 km before it joins the creek. The Wickahoney spring is located at an elevation of 1,603 m. On June 24, 1998, the discharge from this spring into Wickahoney Creek was 0.04 cms. In addition to the Wickahoney spring, two other small springs join the creek. As many as 10 intermittent or ephemeral streams may also join Wickahoney Creek. These streams join the creek near and below the town of Wickahoney. However, the addition of this many intermittent and ephemeral channels does not imply that Wickahoney Creek is perennial. The water from these systems may sub-out or may be lost to evaporation. Wickahoney Creek continues to travel north and east from Wickahoney town site until it joins Big Jacks Creek at an elevation of 1,286 m. Wickahoney Creek is 29 km in length. On July 24, 1997, discharge at the mouth of Wickahoney Creek above the confluence with Big Jacks Creek was 0.01 cms. Currently, annual average and seasonal average discharges are unknown. However, as Wickahoney is a tributary to Jacks Creek, its discharge could be assumed to be negligible at times. As Jacks Creek can be completely dry during both the irrigation and nonirrigation seasons, it can be assumed that Wickahoney can also be dry during one or both of these seasons as well.

2.1.2.5 Hot Creek

The upper bounds of Hot Creek serve as an ephemeral channel to the Bruneau River. In the lower section of Hot Creek (0.5 km up from the Bruneau River) several hot springs discharge into the channel at Indian Bathtub. The

mouth of Hot Creek is approximately 1.6 km upstream from the current USGS gauge (13168500) located on the Bruneau River at an elevation of 808 m. The elevation at the headwaters area is approximately 1,384 m. Hot Creek is 35.07 km in length. IDEQ-TFRO BURP crews visited the upper reaches of Hot Creek in 1998 and noted no discharge. IDEQ-BRO BURP crews visited the creek in the summer of 1995 and noted zero discharge. IDEQ-TFRO personnel visited Hot Creek, approximately 3.22 km from the mouth, near the end of April 2000 and observed that there was zero discharge at that time and no indication of discharge in the previous few weeks or months. Additionally, it was noted that the area the stream channel would have occupied contained upland shrubs, grasses, and a hiking trail. This may indicate that discharge in Hot Creek does not occur even on a seasonal basis. However, at the confluence of Hot Creek and the Bruneau River approximately 0.06 cms of hot spring water is discharged into the Bruneau River. The location of this geothermal spring has been identified as habitat for the Bruneau Hot Springsnail. Discharge from these springs has decreased dramatically in the last 30-40 years. In 1964 as much as 0.15 cms was discharged; by 1990 summer and fall discharge was zero (Berebbrock 1993).

2.1.2.6 Clover Creek

Clover Creek, also known as the East Fork of the Bruneau River, is one of the perennial tributaries to the Bruneau River. It is located in the southeastern portion of the subbasin. Clover Creek is fed by three creeks (Big Flat Creek, Deadwood Creek and Three Creek). The headwaters of Clover Creek are the confluences of those three creeks. The elevation at this point is 1,603 m. Clover Creek flows for over 83.69 km from the headwater confluences to the mouth at the Bruneau River. The elevation of the mouth of Clover Creek is at 921 m. The overall slope of the river is 0.8 percent. The result of such a gentle overall slope can be seen in the very sinuous sections of the river whenever the canyon bottom widens to any degree. A USGS gauge was located on the East Fork of the Bruneau River near Hot Springs, Idaho. The period of record for this gauge was from September 1910 to November 1914, February 1915 to March 1915, and from December 1948 to October 1971. The drainage area of the contributing watershed is 1,606 km^2. The average discharge was 0.93 cms and the average spring discharge was 1.95 cms. Winter discharge average 0.48 cms. Low discharge occurred in the fall and averaged 0.25 cms during the period of record. Summer discharge averaged 1.02 cms.

2.1.2.7 Three Creek

Three Creek is one of the perennial source streams for Clover Creek. It begins in Nevada at an elevation of approximately 1,999 m. From the source it flows north into Idaho and crosses the border at approximately 1,890 m. The total length of the stream in Idaho is 23 km. Three Creek in Idaho is joined by one other perennial stream (Deer Creek) before the junction with Clover Creek. Deer Creek enters Three Creek approximately 10.93 km from Clover Creek. The elevation Three Creek at the Clover Creek junction is 1,600 m. Three Creek flows through relatively steep canyons in the headwaters areas to somewhat broad agricultural valleys as it nears the town of Three Creek and the junction of Clover Creek. The agricultural lands in this area are dominated by pasturelands with some irrigated hay production. A USGS gauge was in operation for several years between 1912 and 1916. During this period average discharge was 0.40 cms, average spring discharge was 0.78 cms, and average summer discharge was 0.42 cms. The low discharge period occurred in the fall season with an average discharge of 0.08 cms. Winter base flow averaged 0.09 cms.

2.1.2.8 Cougar Creek

Cougar Creek is an ephemeral tributary to the Jarbidge River. This junction occurs approximately near river mile nine of the Jarbidge River. Near the Jarbidge River confluence, Cougar Creek is confined within a narrow steep canyon. The mouth of Cougar Creek is at an elevation of 1,286 m. The elevation of the headwaters is approximately 1,823 m. Cougar Creek is entirely within Idaho and is 37.13 km in length. Information from the USGS 1:24K scale maps that cover Cougar Creek indicate that the creek is an ephemeral or intermittent stream.

IDEQ-TFRO BURP crews visited Cougar Creek on July 6, 1998, and noted no discharge. IDEQ-TFRO personnel visited Cougar Creek April 26, 2000, and observed that there was zero discharge at that time and no indication of discharge in the previous few weeks. Additionally, the presence of upland shrubs and grasses indicates that seasonal flows are infrequent in the middle portions of Cougar Creek. In the lower, steep, canyon portion of the drainage, Cougar Creek is intermittent rather than ephemeral due to small springs that persist into the summer.

2.1.2.9 Poison Creek

Poison Creek is an ephemeral tributary to the Jarbidge River. This junction occurs near river mile eight of the Jarbidge River. Near the Jarbidge confluence, Poison Creek is confined within a narrow steep canyon. The mouth of Poison Creek is at an elevation of 1,268 m. The elevation at the headwaters area in Nevada is approximately 2,060 m. Poison Creek is approximately 61 km in length. Approximately 9.6 of these km are located in Nevada. Poison Creek enters Idaho at an elevation of 1,817 m. Information from the USGS 1:24K scale maps, which cover Poison Creek, indicate that the creek is less than an ephemeral or intermittent stream. The map symbols indicate, for over 8 km of the creek, that the creek subs-out or a defined channel for a ephemeral stream does not exist. IDEQ-TFRO BURP crews visited Poison Creek during on June 19, 1996, and noted no discharge. IDEQ-TFRO personnel visited Poison Creek May 10, 2000, and observed that there was zero discharge at that time and no indication of discharge in the previous few weeks.

2.1.2.10 Other Tributaries

The USEPA Reach File Version 3 (Basins 2.01, 2000) was queried to determine and generate a list of the remaining perennial streams in the Idaho portion of the subbasin. From the database associated with this GIS file, 26 streams were identified as perennial. Many of these streams will be assessed in upcoming years. Those streams that are determined to be not meeting the beneficial uses will be added to future iterations of this SBA-TMDL. Many of the remaining perennial streams have had BURP data collected on them. As of yet, the data has not been assessed with updated assessment guidance. The following Table 6 lists the perennial streams and if BURP data has been collected. This list is being provided to those interested parties that might have data on those streams. The BURP data and any other data gathered on those streams will be used to determine which streams and rivers will be added to the §303(d) list. Subsequently, those streams added to the §303(d) list would be included in future iterations of the Bruneau River SBA-TMDL.

Table 6. PERENNIAL STREAMS AND BURP MONITORING

Stream Name	BURP Data
Alder Creek	No
Big Flat Creek	No
Big Jacks Creek	Yes
Black Leg Creek	Yes
Buck Creek	Yes
Bull Creek	Yes
Cottonwood Creek	Yes
Crab Creek	Yes
Dave Creek	No
Deadwood Creek	No
Deer Creek	Yes
Duncan Creek	Yes
East Fork Bull Creek	No
East Fork Jarbidge River	Yes
Flat Creek	No
Jarbidge River	Yes
Little Jacks Creek	No
Louse Creek	Yes
Marys Creek	Yes
Nit Creek	No
Pole Creek	Yes
Salmon Creek	No
Sheep Creek	Yes
Strickland Canyon Creek	No
Trout Creek	Yes
West Fork Bull Creek	No

2.1.2.11 Canals and Drains

The Bruneau River supplies water for irrigation in the wide valley bordering the Snake River through which it flows. The USGS has discharge gauges located on the two main canals, the Buckaroo Ditch and the Hot Springs Ditch. From this data, IDEQ estimates that during the irrigation season about 1.1 cms is diverted on the east side of the river into the Buckaroo ditch and about 0.62 cms on the west side into the Hot Springs Ditch. The South Side Canal also diverts water from the Bruneau River. The amount of water diverted into this canal during the irrigation season is estimated at 0.23 cms. The diversion structures for the Hot Springs and Buckaroo ditches are located downstream from the USGA gauging station at Hot Springs, Idaho. Limited irrigation water returns exist in the Bruneau valley. Typical agriculture returns in the valley consist of a drainage network to remove sub-water from pastures located along the riparian areas and wetland valley bottom. These drains typically do not carry a high sediment load. Bacteria samples from the Bruneau River also indicate that the drains do not carry a large bacteria load. The inference that IDEQ draws from this information is that the sub-water drain system of the Bruneau valley is not a significant source of nutrients, sediment, or bacteria. Additionally, livestock operations in the pastures adjacent to the Bruneau River, in the Bruneau Valley, do not appear to be contributing to the sediment and bacteria loads in the river, as these loads are similar to upstream loads. This may be the result of the lower valley slopes, which do not lend themselves to erosional movements.

2.1.3 Groundwater

Groundwater in the Bruneau Subbasin is an important aspect of the water quality and quantity. The springs in the subbasin are numerous, and the majority of the springs in the area are warm or hot springs. Consequently, streams, where the majority of the flow comes from the hot springs, will naturally not contain cold water biota (e.g., Hot Creek). Furthermore, the USFWS implementation plan for the restoration of the Bruneau hot springs snail will result in higher flows from theses geothermal springs, as was historically natural, into the rivers and streams in the area.

2.1.3.1 Aquifers

The Bruneau-Grandview aquifer is the only aquifer over which the subbasin lies (Figure 18). Depth to groundwater in the Bruneau-Grand View area was estimated to be near 30.5 m in the spring of 1980. Some wells in the area; however, are as deep as 1,219 m. In these cases, the wells have penetrated several layers of the aquifer. Specific capacity in the Bruneau-Grand View area is among the highest in the Western Snake River Plain Aquifer (994 (L/min)/m). Additionally, the transmissivity is also very high. These factors indicate that time of travel in the Bruneau-Grand View area is very short. Newton (1991) estimates time of travel to be in the area of 0.91-2.13 meters per day. Furthermore, typical water movement in the area is from deep volcanic rock layers of the aquifer upward to the sedimentary rock layers.

Limited groundwater level monitoring has been done in the Bruneau-Grand View area. This may be due to the depth of the wells in the area and the fact that many are not cased through the different levels of the aquifer. As a result, the head of the wells is a composite of the three different layers of the aquifer (Newton 1991). Two monitored wells in the subbasin have shown a steady loss of groundwater in the area form the ‘50s up to the year 1980. These losses are in the neighborhood of 9-15 m (Newton 1991). As the recovery plans for the Bruneau Hot Springsnail have been implemented in the last few years, hot springs and wells have increased discharges or have discharged for longer periods. This is an indication that groundwater levels have been increasing since the declines noted in the 1950s-1980. Newton (1991) noted that a substantial amount of groundwater recharge occurs from the surface and groundwater source irrigation in the Bruneau-Grand View area. In the areas to the west and to the east of the Bruneau River, irrigation water comes from the Bruneau-Grandview aquifer through pumping the aquifer and flowing wells. One local farmer indicated that the water from his well that is used for irrigation was approximately 41 EC (which indicates that the water temperature is warm to hot).

In the regional aquifer system analysis done by Newton (1991), he estimated that 23,442 ha/m per year from groundwater and surface water irrigation would be recharged in the Bruneau-Grand View area. Also noted was that from pumped and flowing wells in the area, only 6,169 ha/m were removed. Other losses from the recharge are from natural springs and a substantial amount is lost due to evapotranspiration in the non-irrigated lands of the area (Newton 1991). In the same area, estimated recharge to the aquifer from precipitation is only 851 ha/m. For the Bruneau Grand View area, these numbers indicate that approximately 5.75 cms (18,137 ha/m) of water is available for groundwater springs discharge, evapotranspiration, and aquifer recharge.

IDEQ, using the estimated annual precipitation from the five precipitation classes (see Figure 13), estimated the total annual water yield available for the entire subbasin at 31.57 cms. Of the total annual water yield, 1.95 cms is used for irrigation in the Bruneau area and an unknown quantity is pumped. Using the flow measured at the gauge on the Bruneau River at Hot Springs, underflow to the Bruneau-Grandview aquifers is estimated at 8.21 cms in the spring.

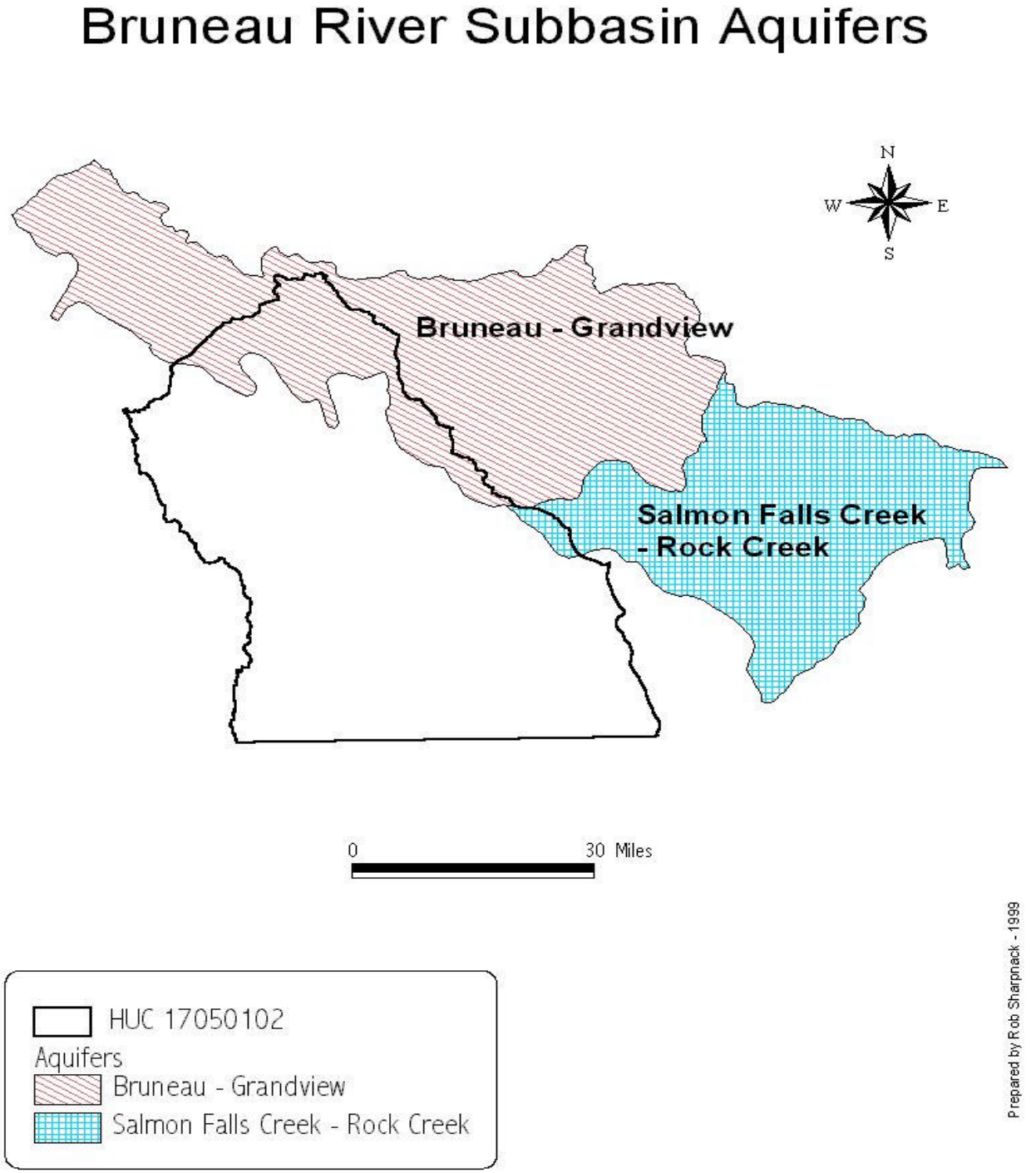


Figure 18. Bruneau-Grand View and Salmon Falls Aquifers.

2.1.4 Biological Characteristics

This section discusses the historical and present day distributions, populations, and biological assessments completed with regards to fisheries, macroinvertebrates, aquatic vegetation, and threatened and endangered species. Fishery and aquatic biota assessments, in some cases, will be used to determine the support status of beneficial uses when water quality data are lacking. In many cases, information concerning the biological communities is very limited. Generally, the information available for assessment of beneficial uses consists of distribution maps, stocking and harvest information, and limited presence/absence studies. Because of these limitations, subbasin-wide generalizations as to the status of fisheries and biological communities will not be made in this document. Additional information is needed; however, each stream for which a TMDL will be developed will be assessed according to the availability of the data. As new streams are assessed and added to the §303(d) lists, the aquatic biological assessment will be completed and added to this document.

2.1.4.1 Fisheries

Assessment of the current fisheries serves as an indication of the present state of water quality in a water body. However, fish are more mobile than other aquatic populations and; therefore, are not the best population for assessing water quality. In some cases, the presence of cold water fishes may be the result of a migrating population. The fishes move into an area when conditions, or water quality, are sufficient and move out of an area when water quality changes or degrades. Additionally, fish assessments are sometimes plagued with size selection problems in the choice of sampling gear. Due to gear selectivity, single pass electrofishing efforts often underestimates the smaller size classes of fishes. Although fish assessments have several drawbacks as noted above, it is often the most abundant data available. In many cases, it is the only information available for assessing the biological communities of a water body.

Assessments of past fisheries can be used to determine what potential changes have or can be made to a water body in relation to water quality improvements. These types of assessments are difficult to make due to a general lack of older data. In some cases, applying historical data collected to answer specific questions in the past may be insufficient for answering alternative questions now. In these cases, often the experimental or monitoring design was insufficient to collect the appropriate data for the needed answers now.

2.1.4.1.1 Bruneau River

In the process of developing the SBA-TMDL for the Bruneau River, IDEQ has not found any studies dealing with the fisheries component of the river. Data and information has been limited to single backpack electrofishing attempts by IDEQ, anecdotal evidence from public meetings, and unpublished best professional judgment of USBLM fisheries biologists. Given the size of the water body during the backpack electrofishing attempts and the gear selectivity problems associated with electrofishing apparatus, it is unlikely that the methods used would provide any useful information concerning the makeup of the fishery in the river. Until such time that fisheries information is developed or located within the 303(d) listed segment of the river, IDEQ will rely on the USBLM information and the anecdotal evidence provided by residents of the Bruneau area. It should be noted; however, that during the electrofishing attempts no salmonids were captured. Only native nonsalmonids were captured. All these fishes (leopard dace, longnosed dace, redside shiner, and sculpin sp.) all are moderately intolerant to sediment and thermal pollution and all prefer cold waters according to the 1996 *Water Body Assessment Guidance* document appendix I (IDEQ 1996). No nonnative or tolerant species were collected.

USBLM unpublished information indicates that historically and currently salmonids are rare in the entire Bruneau River. This is a critical and important assessment by the USBLM for understanding the Bruneau system. The

information also indicates that historically and currently salmonids did not inhabit the lower §303(d) listed section of the Bruneau River. This data is further substantiated by anecdotal evidence provided by the residents of Bruneau. The anecdotal evidence provided by some of the residents of Bruneau indicates that salmonids are in the §303(d) listed segment for only a portion of the year. For the remainder of the year, the amount of water discharged into the river from geothermal springs elevates the temperature in the river. This elevation of stream temperatures forces the fish to move either higher into the watershed or most likely back to CJ Strike Reservoir. As indicated by the residents of Bruneau, the salmonid population inhabits the Bruneau River only during spring runoff. They then move out of the river segment in early to late spring, depending on runoff duration, and remain out of the system until the following year's runoff. It is also noted that the absence of salmonids occurs even in the nonirrigation season, thus supporting the hypothesis that the system functions as a warm water fishery during certain times of the year.

2.1.4.1.2 Jacks Creek

In the process of developing the SBA-TMDL for the Jacks Creek, IDEQ has not found any studies dealing with the fisheries component of the creek. Data and information has been limited to several backpack electrofishing attempts by IDEQ in 1997 and 2000 and observations made during water chemistry monitoring. The fishery is composed of a mixture of cool, cold, and warm water tolerant species. Most of these species are highly tolerant to sediment and thermal pollution. The lone exemption is the ubiquitous redside shiner, a moderately intolerant species that prefers cold water. Other species collected during the electrofishing attempts include northern squawfish (pike minnow), bridgelip sucker, black bullhead, and the chiselmouth. Other species that were noted during monitoring runs include carp and crappie.

2.1.4.1.3 Sugar Creek

No biological assessments of the fisheries have been made on Sugar Valley Wash. Reasons for this lack of information include little or no flow on an annual basis (see section 2.1.2.3). Due to the hydrology of Sugar Creek and Sugar Valley Wash, it is unlikely that a fishery or other aquatic biota has ever existed. As discussed in section 2.1.2.3 of this document, Sugar Creek and Sugar Valley Wash are simply an ephemeral stream through which precipitation events may contribute water for extremely short durations. The basis for removing Sugar Creek from the §303(d) list is that it was listed in error. The original intent may have been to list Sugar Valley Wash. Additionally, due to the natural hydrology of the system, biological and recreational beneficial uses would not exist within the system. Therefore, a TMDL for Sugar Creek will not be completed and IDEQ will remove Sugar Creek from the §303(d) list. However, as stated previously Sugar Valley Wash will be incorporated into the Jacks Creek TMDLs through the land use/land area allocation scheme.

2.1.4.1.4 Wickahoney Creek

In the process of developing the SBA-TMDL for the Wickahoney Creek, IDEQ has not found any studies dealing with the fisheries component of the creek. Data and information have been limited to several backpack electrofishing attempts by IDEQ in 1997 and 2000, observations made during water chemistry monitoring, and unpublished best professional judgment of USBLM fisheries biologists. The best professional judgment of the USBLM fisheries biologists indicates that salmonids are common in the lower sections of Wickahoney Creek up from the confluence with Big Jacks Creek. A culvert at Wickahoney Crossing has formed a fish passage barrier. The USBLM has not collected salmonids in the upper portions of Wickahoney Creek. However, salmonids historically and currently are common at and just below the spring that discharges into Wickahoney Creek near the old town site. These salmonids can and have dispersed during wet years downstream 3-5 km in Wickahoney Creek. The unpublished USBLM information indicates that historically this population of salmonids in the lower portion of

Wickahoney Creek is indeed rare. IDEQ electrofishing data corroborates the USBLM information and therefore supports the hypothesis that a salmonid population exists, although they are currently rare.

IDEQ electrofishing efforts have identified limited numbers of salmonids below Wickahoney Crossing near the confluence with Big Jacks Creek. The fish were limited to several small pools and were possible migrants from Big Jacks Creek. However, salmonid numbers were greater above Wickahoney Creek in the spring near the town site. Abundance diminished downstream in the unnamed tributary to the creek. A stock watering pond may be serving as a fish barrier inhibiting down stream migration except in the wetter years.

After review of the existing information, it appears that salmonid spawning occurs in two locations in the area of Wickahoney Creek. These areas are Big Jacks Creek and the Wickahoney town site spring. These locations seem to serve as dispersal populations of red band trout into Wickahoney Creek during wet years. During dry years, as 2000 has been, salmonids are excluded from Wickahoney Creek due to low or nonexistent flow in significant portions of the creek.

2.1.4.1.5 Hot Creek

Fishery studies in Hot Creek have consisted of ancillary studies for the Bruneau Hot Springsnail. Monitoring reports have indicated populations of both mosquito fish (*Gambusia affinis*) and tilapia (*Tilapia zilli*) present in Hot Creek. However, density and abundance information was not presented (Varicchione and Minshall 1997, Varicchione et al 1998). It was surmised in the 1996 monitoring report that predation from these fishes might be limiting the dispersal of the Bruneau Hot Spring snail into Hot Creek (Varicchione and Minshall 1997). However, subsequent studies found only limited predation on the snails by these two fish taxa (Varicchione et al 1998). Additionally, the water temperature and discharge monitoring reported in the monitoring reports indicated that it is unlikely that cold water biota and salmonid spawning has ever existed in Hot Creek. Furthermore, temperature measurements in the creek indicate that the naturally occurring thermal waters from the seeps and springs exceed IDEQ's standards for warm water biota (33 EC daily maximum 29EC daily average). As cited in the monitoring reports conducted by Idaho State University for the USBLM, the snails have an upper thermal tolerance limit of 35 EC. Thermal data collected on Hot Creek indicate that temperatures range from 30 to 37EC daily (Varicchione and Minshall 1997) year-round. Based on this information, IDEQ proposes to protect Hot Creek under the Clean Water Act with site-specific criteria in so much as water temperature is concerned. The site-specific criteria will be developed with regards to the Bruneau Hot Springsnail and any recovery plans developed for the snail that involve water quality.

2.1.4.1.6 Clover Creek

In the process of developing the SBA-TMDL for Clover Creek, IDEQ has not found any studies dealing with the fisheries component of the creek. Data and information has been limited to several backpack electrofishing attempts by IDEQ in 1997,1999, and 2000, and observations made during water chemistry monitoring. Additionally, the unpublished best professional judgment of the USBLM fisheries biologists indicates that salmonids have not been found in the lower sections of Clover Creek up from the confluence with the Bruneau River. However, the information indicates that red band trout were historically found within this reach. IDEQ electrofishing efforts in this area do not include salmonids in the fish population. Of the species collected, the northern pike minnow, red side shiner, and leopard dace are all classified as moderately intolerant to thermal and organic pollution. However, the chiselmouth sucker was also collected. This fish taxa is classified as highly tolerant.

The fish taxa collected at the upper site below the confluences of the three streams forming Clover Creek's headwaters contained a similar distribution of fish taxa. The population; however , included whitefish and rainbow trout along with the chiselmouths and redsides. The data would indicate that these salmonids might be moving into

Clover Creek from one or more of the upper tributaries. For example, only trout and sculpin were collected from the upper reaches of Big Flat Creek, a tributary to Clover Creek. In the lower reaches of Big Flat Creek, the fish community was similar to Clover Creek.

Electrofishing efforts undertaken in 2000 indicate a very different situation than in the past few years. Large numbers of salmonids were collected in the Clover Crossing area of the creek. The salmonids captured included several very large trout as well as smaller size classes. These fish are probably the results of several good water years. However, during monitoring events that have taken place subsequent to the electrofishing, it has been noted that Clover Creek is again dry in the areas where the trout were in good abundance.

2.1.4.1.7 Three Creek

In the process of developing the SBA-TMDL for Three Creek, IDEQ has not found any studies dealing with the fisheries component of the creek. Data and information has been limited to several backpack electrofishing attempts by IDEQ in 1995, 1998, and 2000, and observations made during water chemistry monitoring.

The downstream sampling location on Three Creek was near the confluence with Clover Creek. Sampling occurred in the spring of 2000. At this location, no salmonids were captured. The species compilation consisted of redsides, chiselmouths, and dace. The species composition is very similar to Clover Creek just downstream. In 1995, Three Creek was electrofished near the confluence of Deer Creek. During this sampling event, no salmonids were collected. The species composition consisted of redsides, mottled sculpin, bridgelip suckers, and speckled dace. All of these species are native fishes and are moderately intolerant to thermal and organic pollution. A third and final sampling event took place in 1998. The site location was at or near the Nevada border. In this location, Three Creek is a very small (less than 0.03 cms) stream. No fish were collected at this location. However, this was not an unexpected occurrence. The size and steepness of the stream, coupled with the high probability of zero flow, leads IDEQ to assess the upper site as naturally fishless.

2.1.4.1.8 Cougar Creek

A biological assessment for the Jarbidge watershed was completed by IDEQ and IDFG as part of the Jarbidge Bull Trout Watershed Advisory Group and for consultation with the USFWS. In this assessment, it was stated that Cougar Creek was intermittent and that it does not support a fishery. It was also noted that in "the upper portion above Cougar Spring [there] likely never was a fishery" (IDEQ 1999). These statements are consistent with the assessment of Cougar Creek provided in this document. Additionally, the Beneficial uses in the downstream stream segment, the Jarbidge River, have been documented as fully supporting it's beneficial uses through the BURP process. Therefore, the basis for removing Cougar Creek from the §303(d) list is that it was listed in error, and that the ephemeral streams of the Jarbidge River, which Cougar Creek is one of, are not impacting the beneficial uses of the Jarbidge River. Therefore, the beneficial uses of the ephemeral streams are assumed to be fully supported. Consequently, a TMDL will not be completed and IDEQ will remove Cougar Creek from the §303(d).

2.1.4.1.9 Poison Creek

A biological assessment for the Jarbidge watershed was completed by IDEQ and IDFG as part of the Jarbidge Bull Trout Watershed Advisory Group and for consultation with the USFWS. In this assessment, it was stated that Poison Creek was intermittent (ephemeral) and that it does not support a fishery. These statements are consistent with the assessment of Poison Creek provided in this document. Additionally, the Beneficial uses in the downstream stream segment, the Jarbidge River, have been documented as fully supporting it's beneficial uses through the BURP process. Therefore, the basis for removing Poison Creek from the §303(d) list is that it was listed in error, and that the ephemeral streams of the Jarbidge River, which Poison Creek is one of, are not impacting the

beneficial uses of the Jarbidge River. Therefore, the beneficial uses of the ephemeral streams are assumed to be fully supported. Consequently, IDEQ's position is that Poison Creek is fully supporting it's beneficial uses. Therefore, a TMDL for Poison Creek will not be completed and IDEQ will remove Poison Creek from the §303(d) list.

2.1.4.2 Macroinvertebrates

IDEQ has developed a multi-metric index of macroinvertebrate communities called the Macroinvertebrate Biotic Index (MBI) to use as an indicator of stream health (IDEQ 1996). The MBI assesses the status of aquatic life beneficial uses in wadeable streams in Idaho. Seven metrics (measures of certain aspects of macroinvertebrate community structure based upon the species present and their relative abundance) are combined. These metrics are normalized by taking the ratio to their ecoregion benchmark, thus giving equal weight to each (and a maximum score of 7 for MBI), and then summed. The macroinvertebrate community, and the water body in which it resides, are considered impaired if the MBI score is less than or equal to 2.5. With a score greater than or equal to 3.5, the water body is considered not impaired, or in good health. Values between 2.5 and 3.5 are considered inconclusive, and require verification before the status of the beneficial uses can be determined.

For the Bruneau Subbasin Assessment, IDEQ assessed the macroinvertebrate communities using a multi-metric index in conjunction with other biological communities and water chemistry. These other data sources will augment any perceived shortcoming of the MBI in assessing the status of aquatic life beneficial uses in streams in the Bruneau subbasin. In the past, IDEQ has relied almost solely on the multi-metric approach in assessing stream health. The process; however, is currently under revision. New metrics and assessment breakpoints are expected after the Bruneau SBA-TMDL are completed. As a result, the old macroinvertebrate index will only be used in conjunction with other ecological data for each stream on the 1998 §303(d) list. However, the use of the macroinvertebrate community will lend further weight to fishery and water chemistry assessments made in previous and following sections. Assessment of macroinvertebrate information, until a new assessment process is developed, will be based on the best professional judgment of IDEQ staff involved with the collection and assessment of this type of data and as corroborating information from other sources.

2.1.4.2.1 Bruneau River

IDEQ has sampled macroinvertebrates in the §303(d) listed section of the Bruneau River on three occasions. One set of samples was collected in 1997 following BURP protocols the other two were collected using the large river protocols. Under the *Water body Assessment Guidance* (IDEQ 1996) for macroinvertebrate data, the 1997 site would have been classified as fully supporting cold water biota (MBI score 3.82).

The macroinvertebrate samples collected by IDEQ were also compared with another multi metric index to determine the status of the Bruneau River. The assessment was completed using the Idaho large river index (IRI) of biological integrity developed by Idaho State University (Royer and Minshall in press) for IDEQ. The IRI is composed of five metrics: taxa richness dominance, percent elmidae, percent predators, and Ephemeroptera Plecoptera Trichoptera richness. The value that was calculated for the 1997 site was 17 out of a possible 23 in the IRI. A value of 17 falls well within the reference data set used to build and test the IRI. This score indicates the macroinvertebrate community of the Bruneau River is similar to the community within a set of reference or fully supported rivers.

In 1998, IDEQ conducted macroinvertebrate collections following large and medium sized river protocols on the §303(d) section at two locations. The sampling was conducted near the upper boundary and at the lower boundary of the listed segment. The IRI score for the lower site also indicated that cold water biota are within the reference data set used to compile the multi-metric index. This site, near the bridge on Highway 51, scored 17, indicating

conditions similar to the reference conditions. The upper-most site, near Hot Creek, was incomplete. Consequently, no macroinvertebrate metrics could be calculated from the information gathered.

The macroinvertebrate data and other information presented in previous and following sections indicates that the beneficial uses of cold water biota and primary contact recreation are fully supported in the §303(d) listed segment.

2.1.4.2.2 Jacks Creek

IDEQ collected macroinvertebrates in Jacks Creek twice in 1997. One set of samples was collected in the upper reaches of the creek, while the other was collected in the lower reaches. Both collections indicate that additional verification is needed to determine the support status of cold water biota in the creek. The MBI scores were 2.72 and 2.6 respectively. Water chemistry and fisheries data corroborate these macroinvertebrate index scores indicating beneficial uses impairment. IDEQ monitoring data indicates that the Jacks Creek system contains very high nutrients and seasonally elevated sediments. The fisheries data available for the system indicates that the community is dominated by species tolerant to organic enrichment and temperature elevation. These data sets both indicate that the beneficial uses are not fully supported. High levels of nutrients year-round are causing nuisance aquatic plant growths with low dissolved oxygen problems following. Sediment concentrations are also elevated during the spring. Furthermore, high levels of bacteria can be found in the creek regardless of the season. These factors indicate to IDEQ that agricultural return waters are introducing high levels of nutrients and possibly bacteria. Furthermore, concentrations of livestock along the stream system are also contributing nutrients and bacteria. Also, there are several aquaculture facilities that discharge to the creek. These facilities may exacerbate the current excess nutrients situation.

2.1.4.2.3 Sugar Creek

Macroinvertebrates have never been collected in Sugar Creek; the creek has always been dry when the BURP crews have visited. As stated previously, Sugar Creek is an ephemeral water body and was included in the original listing for Sugar Valley Wash, upon discovery of this error IDEQ is delisting Sugar Creek while retaining Sugar Valley Wash. The delisting will be based on an error in the original list. Macroinvertebrates have never been collected in the ephemeral water body Sugar Valley Wash. However, the downstream water body is not fully supported. Therefore a TMDL will be required for Sugar Valley Wash. Additionally, Sugar Valley Wash lies within the watershed and land use area of Jacks Creek. Therefore, Sugar valley Wash will be incorporated into the Jacks Creek allocations which are based on land area.

2.1.4.2.4 Wickahoney Creek

Macroinvertebrates have been collected in the Wickahoney system three times by IDEQ. One collection, in 1995, was the basis for retaining the creek on the 1998 303(d) list. Once in 1997, and again in 1998, additional collections were made in the system. In 1997, macroinvertebrates were collected in the lower intermittent reaches of the Wickahoney Canyon near Big Jacks Creek. At this location, which is representative of the creek from Wickahoney Crossing to Big Jacks Creek, the MBI score was 2.45. The score is inconsistent with other data collected in the reach. Water chemistry indicates nutrients, bacteria, and sediments are all at low to moderate levels. IDEQ fish data indicates that salmonids are present in the lower section but may be migrants from Big Jacks Creek. Unpublished USBLM data indicates that salmonids are common in this reach of the Creek. During better water years, salmonids may be more common in this reach as they are able to move from Big Jacks Creek and possibly from upstream sources. IDEQ has uncovered no other data that would indicate that the beneficial uses in the lower segment of the creek are not supported. It is IDEQ's hypothesis that the low MBI score reflects the availability of water. The reach in question may go dry in the later part of each summer making the system an intermittent water body. Therefore, according to Idaho water quality standards, recreational beneficial uses standards apply only at 0.14cms and above,

while biotic beneficial use standards apply at 0.03 cms and above Based upon monitoring results and the MBI score, IDEQ proposes to continue monitoring Wickahoney Creek to determine if a TMDL is required. However at this time no TMDL will be completed.

A second set of samples was collected in the unnamed tributary to the creek near the Wickahoney town site. The macroinvertebrate information corroborates the fisheries and water chemistry evidence collected by IDEQ and the USBLM. The MBI score at this location was 3.63, indicating that the beneficial uses in the tributary are supported. The unpublished USBLM fish data indicate that salmonids are common. IDEQ fish data support the USBLM information. The spring-fed tributary also serves as the sole source of perennial water to Wickahoney Creek as outlined in previous sections of this SBA. The tributary may also serve as a refugia for salmonids in the upper segment of the creek during low water years. However, a fish passage barrier at Wickahoney Crossing limits this refugia to salmonids found in the upper reaches of the creek. At this time, IDEQ suggests that the beneficial uses in the tributary are supported. While the upper portion of Wickahoney Creek are influenced by the town site spring it is uncertain how far down the positive effects are seen in the creek. While monitoring the creek in 2000, IDEQ noted that only a fraction of the water discharged from the town site spring makes it as far a Wickahoney Crossing.

2.1.4.2.5 Hot Creek

IDEQ has not collected macroinvertebrates in Hot Creek. However, extensive studies of the Bruneau Hot Springsnails have been conducted by Idaho State University and others. In 1952, the first collection of the species were made by Boys Malkin in the Indian Bathtub area of Hot Creek (Federal Register vol. 63 no.116 1998). The Indian Bathtub Spring and Hot Creek are considered type localities for the Bruneau Hot Springsnail (Federal Register vol. 63 no.116 1998). The snail populations in Hot Creek have been limited in the past by sedimentation events from the upstream ephemeral channel. An event in 1991 reduced the available habitat in the Indian Bathtub area to less that half the previous amount (Varicchione and Minshall 1997). Furthermore, groundwater mining has reduced the amount of discharge from Hot Creek further reducing the available habitat. Additionally, a high runoff event in 1992 reduced the population of snails in Hot Creek itself (Varicchione and Minshall 1997).

The snails in Hot Creek have been heavily impacted by upstream events. However, the relationship with the impacts and upstream water quality are not closely tied. Typically there is no upstream water. As a result, water quality standards would not apply. Therefore, applying a TMDL model to the upstream system would not be feasible. The load allocations could not be based on a flow regime as one does not exist in the area above the Indian Bathtub. As a result, IDEQ will not apply TMDL load allocations to the upper portion of the watershed. The area and the snails would be better protected through land management agencies and the standards and guides that apply to the activities that occur in the upper watershed. However, water quality in the lower portion of Hot Creek can be TMDL regulated by IDEQ. As no other measure of the macroinvertebrate community exists for support status determination, IDEQ will rely on the water chemistry monitoring and snail studies to determine that status. Additionally, given the thermal nature of the system, it is unlikely that the MBI would have given meaningful results for Hot Creek.

2.1.4.2.6 Clover Creek

IDEQ has collected macroinvertebrate information three times on Clover Creek after the 1998 §303(d) list was compiled. The macroinvertebrate data indicates that the cold water biota beneficial use is supported. MBI scores for the upper section of the creek below the confluences of the Big Flat-Three Creek area was 5.32. This score was very similar to the set of samples collected in 1995 (MBI score 5.44) in this same reach. The area represented by this site is from the headwaters to the Doe Flat area, approximately 8 river km. The next reach of the river from Doe Flat to the Clover Crossing was sampled in 1997. In this reach, the MBI score was 4.58. The final reach from Clover Crossing to the Bruneau River was also sampled in 1997. The MBI score for this reach was 4.2. All of the

index scores for Clover Creek were well above the 3.5 value used in the listing/delisting decisions for the 1998 §303(d) list for full support of the cold water beneficial use. Corroborating information is lacking in this listed water body. Suspended sediment and nutrient data collected by IDEQ supports the macroinvertebrate data (see section 2.4.6). Because the segment is listed for sediment, Wolman pebble counts were used to determine the percent of fine surface sediment in the creek. The percent surface fines of Clover Creek were not statistically different from the surface fines measured in a hydrologically, geologically, and morphologically similar stream (Big Flat Creek) that currently has fully supported beneficial uses. Total suspended sediment samples were also very low in Clover Creek (12 mg/L annual average). Therefore, IDEQ has no reason to refute the MBI scores for Clover Creek. We find that the aquatic life beneficial uses are fully supported in Clover Creek.

2.1.4.2.7 Three Creek

IDEQ has not collected macroinvertebrates within the Three Creek system following the data collection made to retain the creek on the 1998 §303(d) list. Consequently, IDEQ will pursue future collections of macroinvertbrates following the implementation of the sediment TMDL. This will be done in order to determine if the goals of the TMDL are being met and if more stringent sediment targets are required.

2.1.4.2.8 Cougar Creek

IDEQ has not been able to collect macroinvertebrates within the Cougar Creek system in many years due to the ephemeral nature of the system. In each field season that the creek was visited (1993-1998) it was always dry. Consequently, it was retained on the 1998 §303(d) list until such time that a TMDL or other assessment was made to determine the status of the beneficial uses. Throughout this SBA, it has been stated that no TMDL will be completed and the creek will be removed from the 303(d) list. The removal is based upon the fact that the beneficial uses in the perennial waters downstream of the creek being fully supported. Therefore, it is assumed that the ephemeral waters are not degrading the beneficial uses in the receiving waters. Consequently, it is assumed that the beneficial uses in the ephemeral stream are fully supported as well.

2.1.4.2.9 Poison Creek

IDEQ has not been able to collected macroinvertebrates within the Poison Creek system in many years due to the ephemeral nature of the system. In each field season that the creek was visited (1993-1998) it was always dry. Consequently, it was retained on the 1998 §303(d) list until such time that a TMDL or other assessment was made to determine the status of the beneficial uses. Throughout this SBA, it has been stated that no TMDL will be completed and the creek will be removed from the 303(d) list. The removal is based upon the fact that the beneficial uses in the perennial waters downstream of the creek being fully supported. Therefore, it is assumed that the ephemeral waters are not degrading the beneficial uses in the receiving waters. Consequently, it is assumed that the beneficial uses in the ephemeral stream are fully supported as well.

2.1.4.3 Endangered, Threatened, and Sensitive Species

Within the §303(d) listed Bruneau River reach are as many as 230 thermal springs and seeps that are the historical and present range of the Bruneau Hot Springsnail. Along with the snail several other endangered, threatened and sensitive species are listed within the Bruneau subbasin. Table 7 displays threatened and endangered species found within the Bruneau River Subbasin.

Table 7. THREATENED AND ENDANGERED SPECIES IN THE BRUNEAU RIVER SUBBASIN

Species Common Name	Scientific Name	Comments
Bruneau Hot Springsnail	*Pyrgulopsis bruneauensis*	Originally listed in 1993, delisted by court order later that year. Reinstated in 1995, and reconfirmed in 1998.
Spotted Frog	*Rana lateiventris*	Considered the Great Basin sub-populations of the Columbian spotted frog. Determined that listing was warranted 1993. Currently a Candidate species.
Bull Trout	*Salvvelinus confluentus*	Emergency listed in 1998. Final decision and listing occurred in 1999.
Ute Ladies-tresses	*Spiranthes diluvialis*	Recognized as a distinct species in 1984. Listed as threatened in 1992.
Canada Lynx	*Lynx canadensis*	Proposed for listing as threatened.
Gray Wolf	*Canus lupus*	Currently listed as endangered.
Bald Eagle	*Haliaeetus leucocephalus*	First protected in 1966 by the Endangered Species Preservation Act. Listed in 1973 under the ESA. Down listed from endangered to threatened in 1995.
Peregrine Falcon	*Falco perigrinus anatum*	First Protected in 1969 by the Endangered Species Conservation Act. Listed under the ESA in 1973. Recommended for delisting in 1995.

2.1.4.3.1 Bruneau Hot Springsnail

This species of snail only occurs within springs and seeps that arise from a thermal aquifer along the lower reach of the Bruneau River. A survey was completed in 1996 to determine their present distribution. As of 1996, the Hot Springsnails were located in 110 of 204 (54 percent) seeps and springs along the Bruneau River (Mladenka and

Minshall 1996). Most of the springs located in the §303 (d) listed segment are not typical Hot Springsnail habitat due to the higher temperatures found in these spring sources (Federal Register vol. 63 no.116 1998). The greatest threat to the Bruneau Hot Springsnail has been identified as reductions in spring and seep flow due to groundwater pumping. To alleviate the amount of groundwater pumped from the aquifer IDWR, USFWS and USGS have developed plans to reduce pumping. These plans rely on less groundwater removals and more surface water being removed from the system. As this occurs, temperatures in the Bruneau river and Hot Creek may likely increase. These management goals may be in direct conflict with temperature TMDLs which goals would be to reduce temperatures in the Bruneau River. Consequently, IDEQ proposes to reevaluate the listing of the Bruneau River for temperature and the designated beneficial uses of the §303(d) listed segment. This reevaluation would take place after the current court-imposed TMDL schedule has been fulfilled. At that time, the segment would be reprioritized on the 303(d) list and temperature studies of the springs and river would be undertaken. Following this, it would be determined what actions IDEQ could enact with regards to the beneficial uses, TMDLs, and the Bruneau Hot Spring Snail recovery requirements.

2.1.4.4 Aquatic Vegetation

Throughout the spring and summer of 2000, IDEQ conducted water quality monitoring on the §303(d) listed waterbodies within the Bruneau River Subbasin. During these monitoring events, other water quality observations were made, the number and type of fishes observed and the approximate dates and times the various streams in the subbasin went dry. In addition to these observations, IDEQ has noted a lack of nuisance or objectionable aquatic plants in the streams with the exception of Jacks Creek. Most locations are completely devoid of aquatic plant mats that would indicate excessive aquatic growths due to excess nutrients. In other locations the aquatic plants are localized and do not cover large portions of the streambeds. In addition, IDEQ has not received any complaints concerning aquatic vegetation within the subbasin.

2.2 Water Quality Concerns and Status

The Clean Water Act established a process for restoring the nation's water bodies to health. Part of this was the designation of impacted waters by the states, through listing such waters as in §303(d). The 1996 §303(d) list for the state of Idaho (USEPA 1996) included 16 segments occurring within the region designated as the Bruneau River Subbasin (Table 8 and Figure 19). Nine segments remain on the 1998 §303(d) list (see Figure 1). These nine segments are described below and in following tables and figures.

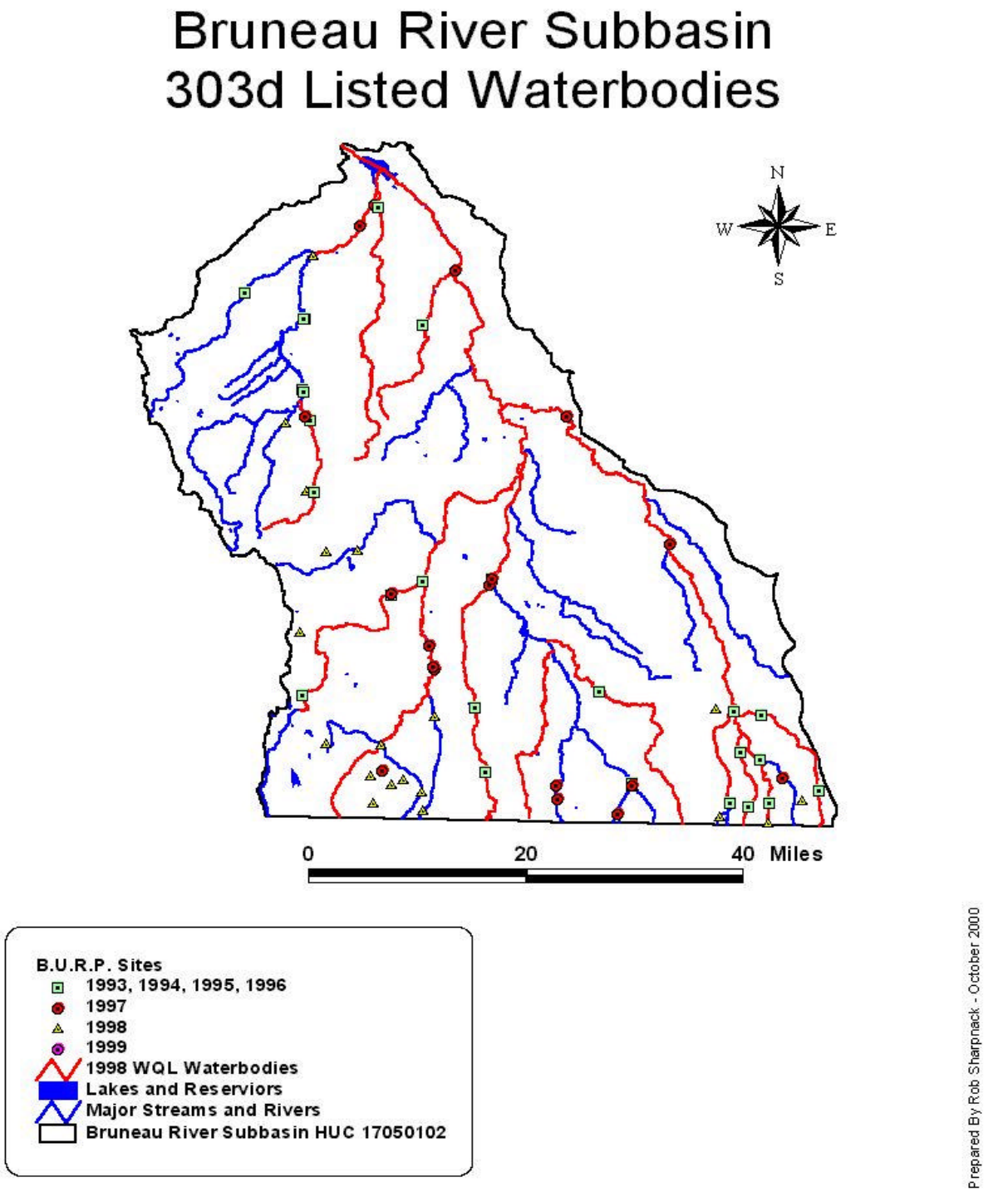


Figure 19. Water Quality Limited River and Stream Segments of the Bruneau River Subbasin.

2.2.1 General Information on Point and Nonpoint Sources

The major sources of pollutants for the Bruneau River reach were identified in the 1992 §305(b) report. This report contains information regarding the types of pollutants affecting beneficial uses and the major sources of these pollutants. Additionally, it was the basis for listing for the remaining streams on the 1998 §303(d) list. Notably no point sources were identified as major sources of pollutants. However, point sources do exist within the subbasin. Sources of pollutants from point sources may include aquaculture, confined animal feeding operations, and municipalities. The pollutants listed from typical National Pollution Discharge Elimination System (NPDES) permits are ammonia; Biochemical Oxygen Demand; biological waste; deleterious materials; fecal coliform and other bacteria; floating, suspended or submerged matter; nutrients, including phosphorus and nitrogen compounds; oil and grease; oxygen demanding materials; residual disinfectants, including residual chlorine; residual disease control drugs and other chemicals; residual feed and nutritional supplements; sediment; settable solids; temperature; pH; total suspended solids; toxic substances; and turbidity.

For the Bruneau River reach, the 1992 §305(b) report indicated that major contributors of nonpoint source pollutants were irrigated croplands, pasture land treatments, range land activities, aquaculture, removal of riparian vegetation, flow regulation, stream bank destabilization, small dam construction, feedlots, and from natural sources (IDEQ 1992). Typical pollutants from these sources include sediment, nutrients, pathogens, salts, toxic substances, thermal modifications, and habitat modifications.

Table 8. 1998 §303(d) LISTED WATER BODIES IN THE BRUNEAU RIVER SUBBASIN

WATER BODY	STREAM SEGMENT HUC[1] / PNRS[2]	BOUNDARIES	POLLUTANTS AND/OR STRESSORS[3]				
			1	2	3	4	5
Bruneau River	17050102 / 549	Hot Creek to CJ Strike Reservoir	S	N	T	Q	
Hot Creek	17050102 / 557	Headwaters to Bruneau River	S	Q	B		
Jacks Creek	17050102 / 551	Little Jacks to CJ Strike	N	S	Q	T	DO
Poison Creek	17050102 / 568	Headwaters to Jarbidge River	S				
Sugar Creek	17050102 / 552	Headwaters to Jacks Creek	S				
Three Creek	17050102 / 561	Headwaters to Clover Creek	S				
Clover Creek	17050102 / 558	71 Draw to Bruneau River	S				
Cougar Creek	17050102 / 567	Headwaters to Jarbidge River	S				
Wickahoney Creek	17050102 / 555	Headwaters to Big Jacks Creek	S	Q			

[1]HUC = Hydrologic Unit Code designation by USGS for Upper Snake Basin. [2]PNRS = Pacific Northwest River Study designation number. [3]Pollutants and/or stressors are listed as they appear on the 1996 §303(d) list. Pollutants and/or stressors: N = Nutrients; S = Sediment; Q = Flow Alteration; T = Temperature; B = Pathogens; DO = Dissolved Oxygen.

2.2.2 Water Quality Limited Stream Segments in the subbasin

The following sections describe each 1998 water quality limited segment located in the Bruneau River reach, and the pollutants identified by various agencies from the 1992 §305(b) Report. These pollutants and sources (Table 9-9d) were some of the basis for the original §303(d) listings. The boundaries for each segment can be found in Table 8.

2.2.2.1 Bruneau River

Two agencies, the USBLM and IDEQ, provided lists of pollutants and pollutant sources for the original §305(b) listing of the Bruneau River segment.

Table 9. 1992 §305(b) REPORT: POLLUTANTS AND SOURCES IN THE BRUNEAU RIVER

SOURCE AGENCY:USBLM				SOURCE AGENCY:IDEQ		
Pollutant Source	**Pollutant**			**Pollutant Source**	**Pollutant**	
Irrigated Crop	SED			Irrigated Crop	NUT	SED
Pasture	SED	Q		Pasture	NUT	SED
Range	SED			Aquaculture	NUT	SED
Aquaculture	NUT	TEMP	Q			
Flow Regulation	Q					
Riparian Habitat Removal	H					
Streambank Destabilization	H					
Small Dam Construction	Q					
Natural	TEMP					
Pollutants and/or stressors: NUT = Nutrients; SED = Sediment; Q = Flow Alteration; TEMP = Temperature; BCAT = Pathogens; O = Organic Enrichment; H = Habitat alteration.						

2.2.2.2 Jacks Creek

Two agencies, the USBLM and IDEQ, provided pollutants and pollutant sources for the original §305(b) listing of the Jacks Creek segment.

Table 9a. 1992 §305(b) REPORT: POLLUTANTS AND SOURCES IN JACKS CREEK

SOURCE AGENCY:USBLM				SOURCE AGENCY:IDEQ		
Pollutant Source	**Pollutant**			**Pollutant Source**	**Pollutant**	
Irrigated Crop	SED			Irrigated Crop	NUT	SED
Pasture	SED	Q		Pasture	NUT	SED
Range	SED			Aquaculture	NUT	SED
Aquaculture	NUT	TEMP	Q	Feed Lots	O	
Flow Regulation	Q					
Riparian Habitat Removal	H					
Streambank destabilization	H					
Pollutants and/or stressors: NUT = Nutrients; SED = Sediment; Q = Flow Alteration; TEMP = Temperature; BCAT = Pathogens; O = Organic Enrichment; H = Habitat alteration.						

2.2.2.3 Sugar Creek

IDEQ provided a list of pollutants and pollutant sources for the §305(b) report and the subsequent listing of Sugar Creek.

Table 9b. 1992 §305(b) REPORT: POLLUTANTS AND SOURCES IN SUGAR CREEK

SOURCE AGENCY:IDEQ	
Pollutant Source	**Pollutant**
Irrigated Crop	SED
Pasture	SED
Aquaculture	SED
Pollutants and/or stressors: SED = Sediment.	

2.2.2.4 Wickahoney Creek

The USBLM was the only agency that provided information for the §305(b) report and the subsequent listing of Wickahoney Creek.

Table 9c. 1992 §305(b) REPORT: POLLUTANTS AND SOURCES IN WICKAHONEY CREEK

SOURCE AGENCY:USBLM			
Pollutant Source	**Pollutant**		
Range	SED	Q	
Riparian Habitat Removal	H		
Streambank Destabilization	SED		
Pollutants and/or stressors: SED = Sediment; Q = Flow Alteration; H = Habitat alteration.			

2.2.2.5 Hot Creek

Two agencies, the USBLM and IDEQ, provided pollutants and pollutant sources for the original §305(b) listing of the Hot Creek segment.

Table 9d. 1992 §305(b) REPORT: POLLUTANTS AND SOURCES IN HOT CREEK

SOURCE AGENCY:USBLM				SOURCE AGENCY:IDEQ		
Pollutant Source	**Pollutant**			**Pollutant Source**	**Pollutant**	
Range	SED			Range	SED	
Flow Regulation	Q	H				
Riparian Habitat Removal	H					
Streambank Destabilization	SED	H				
Recreation	BACT					
Pollutants and/or stressors: NUT = Nutrients; SED = Sediment; Q = Flow Alteration; TEMP = Temperature; BCAT = Pathogens; O = Organic Enrichment; H = Habitat alteration.						

2.2.2.6 Clover Creek

IDEQ was the only agency that provided information for the §305(b) report and the subsequent listing of Clover Creek. Rangeland was identified as the pollutant source. Sediment was identified as impairing the beneficial uses.

2.2.2.7 Three Creek

IDEQ was the only agency that provided information for the §305(b) report and the subsequent listing of Three Creek. The pollution source was identified in the report as coming from the rangeland. The pollutant impairing the beneficial uses was identified as sediment.

2.2.2.8 Cougar Creek

IDEQ was the only agency providing information for the §305(b) report and the subsequent listing of Cougar Creek. The pollution source was identified in the report as coming from the rangeland. The pollutant impairing the beneficial uses was identified as sediment.

2.2.2.9 Poison Creek

IDEQ was the only agency providing information for the §305(b) report and the subsequent listing of Poison Creek. The pollution source was identified in the report as coming from the rangeland. The pollutant impairing the beneficial uses was identified as sediment.

2.3 Applicable Beneficial Uses and Water Quality Standards

Under the state water quality standards, Idaho is divided into six separate hydrologic basins. Within each basin, the major rivers, lakes/reservoirs, and creeks are identified (designated) for specific beneficial uses. Most tributary waters; however, are not yet designated. These undesignated waters are protected for all recreation uses and for the protection and propagation of fish, shellfish, and wildlife wherever attainable (IDAPA §58.01.02.101.01.a.). Industrial water supplies, wildlife habitats, and aesthetics are minimum designated standards for all waters of the state.

Other water quality standards that apply to the Bruneau River SBA-TMDL are IDAPA §58.01.02.051.01-02, which is the state's Antidegradation Policy. It reads:

> Maintenance of Existing Uses for All Waters. The existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
>
> High Quality Waters. Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the Department finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the Department's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the Department shall assure water quality adequate to protect existing uses fully...

58.01.02.50.01 states:

> Apportionment of water. The adoption of water quality standards and the enforcement of such standards is not intended to conflict with the apportionment of water to the state through any of the interstate compacts or court decrees, or to interfere with the rights of Idaho appropriators, either now of in the future, in the utilization of the water appropriations which have been granted to them under the statutory procedure…

58.01.02.50.02.a states:

> Wherever attainable, surface waters of the state shall be protected for beneficial uses which for surface waters includes all recreational use in and on the water surface and the preservation and propagation of desirable species of aquatic biota…

58.01.02.50.02.c states:

> In all cases, existing beneficial uses of the waters of the state will be protected.

Table 10 summarizes Idaho's beneficial uses and criteria for its water bodies. Those uses designated for selected water bodies within the Bruneau River Subbasin are identified in Table 8, as defined in IDAPA §58.01.02.150.

Table 10. STATE OF IDAHO RECOGNIZED BENEFICIAL USES

BENEFICIAL USES	APPLICABLE CRITERIA
Agricultural Water Supply	Waters which are suitable or intended to be made suitable for the irrigation of crops or as drinking water for livestock. (IDAPA §58.01.02.100.03.b) Numeric criteria as needed are derived from the USEPA's Blue Book. (IDAPA §58.01.02.252.02)
Domestic Water Supply	Waters which are suitable or intended to be made suitable for drinking water supplies. (IDAPA §58.01.02.100.03.a) Numeric criteria for specific constituents and turbidity. (IDAPA §58.01.02.252.01.a-b)
Industrial Water Supply	Waters which are suitable or intended to be made suitable for industrial water supplies. This use applies to all waters of the state. (IDAPA §58.01.02.100.03.c) Numeric criteria are categorized as general surface water quality criteria. (IDAPA §58.01.02.252.03)
Cold Water Biota	Waters which are suitable or intended to be made suitable for protection and maintenance of viable communities of aquatic organisms and populations of significant aquatic species which have optimal growing temperatures below 19^{o}C. (IDAPA §58.01.02.100.01.a) Numeric criteria are established for pH, DO, gas saturation, residual chlorine, water temperature, ammonia, turbidity, and toxics. (IDAPA §58.01.02.250.02.a-d)
Warm Water Biota	Waters which are suitable or are intended to be made suitable for protection and maintenance of viable communities of aquatic organisms and populations of significant aquatic species which have optimal growing temperatures above 19^{o}C. (IDAPA §58.01.02.100.01.d) Numeric criteria are established for pH, DO, gas saturation, residual chlorine, water temperature, ammonia, and toxics. (IDAPA §58.01.02.250.04.a-c)
Salmonid Spawning	Waters which provide or could provide habitat for active self-propagating populations of salmonid fishes. (IDAPA §58.01.02.100.01.b) Numeric criteria are established for pH, gas saturation, residual chlorine, DO, intergravel DO, water temperature, ammonia, and toxics. (IDAPA §58.01.02.250.02.e)
Seasonal Cold Water Biota	Water quality appropriate for the protection and maintenance of a viable aquatic life community of cool and cold water species, where cold water aquatic life may be absent during, or tolerant of, seasonally warm temperatures (IDAPA §58.01.02.100.01.c). Numeric criteria are established for pH, gas saturation, residual chlorine, DO, intergravel DO, water temperature, ammonia, and toxics. (IDAPA §58.01.02.250.03.a-c)
Primary Contact Recreation	Surface waters which are suitable or are intended to be made suitable for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such waters include, but are not restricted to; those used for swimming, water skiing, or skin diving. (IDAPA §58.01.02.100.02.a) Numeric criteria are established for fecal coliform bacteria applied between May 1 and September 30 (recreation season). (IDAPA §58.01.02.251.01.a-b)

BENEFICIAL USES	APPLICABLE CRITERIA
Secondary Contact Recreation	Surface waters which are suitable or are intended to be made suitable for recreational uses on or about the water which are not included in the primary contact category. These waters may be used for fishing, boating, wading, and other activities where ingestion of raw water is not probable. (IDAPA §58.01.02.100.02.b) Numeric criteria are established for fecal coliform bacteria. (IDAPA §58.01.02.251.02.a-b)
Wildlife Habitats	Waters which are suitable or are intended to be made suitable for wildlife habitats. This use applies to all surface waters of the state. (IDAPA §58.01.02.100.04) Numeric criteria are categorized as general surface water quality criteria. (IDAPA §58.01.02.253.01)
Aesthetics	This use applies to all surface waters of the state. (IDAPA §58.01.02.100.05) Numeric criteria are categorized as general surface water quality criteria. (IDAPA §58.01.02.253.02)
Special Resource Water	Those specific segments or waterbodies which are recognized as needing intensive protection to preserve outstanding or unique characteristics. Designation as a special resource water recognizes at least one of the following characteristics: (1) the water is of outstanding high quality, exceeding both criteria for primary contact recreation and cold water biota; (2) the water is of unique ecological significance; (3) the water possesses outstanding recreational or aesthetic qualities; (4) intensive protection of the quality of the water is in paramount interest of the people of Idaho; (5) the water is part of the National Wild and Scenic River System, is within a state or National Park or wildlife refuge and is of prime or major importance to that park or refuge; (6) intensive protection of the quality of the water is necessary to maintain an existing but jeopardized beneficial use. (IDAPA §58.01.02.056) Special resource waters receive additional point source discharge restrictions. (IDAPA §58.01.02.054.03 and 400.01.b)
NOTE: All waters are protected through general surface water quality criteria. Narrative criteria prohibit ambient concentrations of certain pollutants that impair designated uses. Narrative criteria established in Idaho water quality standards include: hazardous materials; toxic substances; deleterious materials; radioactive materials; floating; suspended; or submerged matter; excess nutrients; oxygen demanding materials and sediment. (See IDAPA §58.01.02.200.01-08)	

2.3.1 Applicable Designated and Existing Beneficial Uses

Applicable designated and existing uses are those uses designated by the Idaho State Legislature through negotiated rule making. The beneficial uses are based on recommendations provided by IDEQ via the Board of Environmental Quality and those uses discovered through the BURP process and subsequent water body assessment to be existing in the water body.

Table 11. DESIGNATED AND EXISTING BENEFICIAL USES OF THE BRUNEAU RIVER SUBBASIN

WATER BODY	CWB	WWB	SS	PCR	SCR
Bruneau River: Hot Creek to C.J Strike Reservoir	D		D	D	
Jacks Creek: Little Jacks Creek to CJ Strike Reservoir		E			
Sugar Creek: Headwater to Jacks Creek					
Wickahoney Creek: Headwaters to Big Jacks Creek	E		E		
Hot Creek: Headwaters to Bruneau River		E			
Clover Creek	E		E		
Three Creek: Headwaters to Clover Creek	E				
Cougar Creek					
Poison Creek					
CWB = Cold Water Biota; WWB = Warm Water Biota; SS = Salmonid Spawning; PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; D = Designated; E = Existing Beneficial Use documented.					

2.3.2 Applicable Water Quality Standards

Violations of the following narrative, numeric water quality standards, IDEQ recommendations, and USEPA guidelines have been documented through monitoring events in 2000 and from past studies. Not all listed waterbodies have had documented water quality violations. Those waterbodies in which violations have been documented follow the criteria that were violated.

A. Excess nutrients

IDAPA §58.01.02.200.06 states, "Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses." Nutrients in excess quantities often cause rapid eutrophication of aquatic systems. The primary production in an aquatic system is often limited by the available concentrations of one of these micronutrients at a time (Brorchardt 1996). In the western United States, phosphorus is typically the nutrient that most limits production of aquatic plants and algae. Nitrogen (N) to phosphorus (P) ratios are often used to determine the limiting factor in aquatic vegetation production and biomass. If all nutrients are in excess quantities; however, the ratios are of little use (Schanz and Juon 1983). Other factors, such as light or available substrates then may limit production of aquatic macrophytes.

A reduction in phosphorus would reduce vegetative growths. This shift and reduction in production and biomass would likely be due to the magnitude of vegetative growths associated with the different micronutrients. When nitrogen is limiting, additions of the nutrient can increase vegetation biomass theoretically by 70 times the molecular weight of the nutrient. In contrast, with phosphorus additions the increase is closer to a 500-fold increase in biomass (Wetzel 1975). Because of this, a reduction in phosphorus can reduce the aquatic vegetation to a greater extent than can reductions in nitrogen.

While no state standards exist for the numeric value of excess nutrients (phosphorus in this case), USEPA has suggested guidelines to determine when phosphorus is in excess. To prevent the development of biological nuisance and to control accelerated cultural eutrophication, total phosphorus (as P) should not exceed 0.05 mg/L in streams that enter a lake or reservoir (USEPA 1977, 1988). As a guideline, the USEPA has suggested that total phosphorus (as P) not exceed 0.1 mg/L in any stream or other flowing waters (USEPA 1986). Both Jacks Creek and the Bruneau River will be assessed with the 0.05 mg/l TP monthly average 0.08 mg/L TP daily maximum standard as they discharge directly into a reservoir. The remaining systems will be assessed using the 0.1 mg/L TP monthly average and 0.16 mg/l TP daily maximum guidelines as they are free flowing rivers or streams.

Jacks Creek, which flows into a reservoir, exceeded the instantaneous or daily maximum TP guidelines (0.08 mg/L TP) in all sampling events. In addition in those months with more than one data point Jacks Creek exceeds the monthly average TP guideline of 0.05 mg/L for rivers and streams flowing into lakes and reservoirs in all cases (see section 2.4.2).

The Bruneau River, which flows into a reservoir, exceeded the monthly average TP guidelines in 3 of 8 months (in July, August, and October). In those months with less than one data point, the Bruneau River exceeded the daily maximum TP guideline (0.08 mg/L) for rivers flowing into lakes and reservoirs once, in August of 1998 (see section 2.4.1).

Three Creek, which is a free flowing stream, exceeded the 0.1 mg/L monthly average TP guideline once in seven months of available data (June of 2000). In no cases did Three Creek exceed the daily maximum TP guideline. Other measures used to corroborate a nutrient problem in Three Creek, such as low DO and elevated pH, did not exceed state water quality standards. Due to the single exceedance and no corroboration with other numeric standards a nutrient TMDL will not be completed. However, further monitoring of the nutrients of Three Creek is proposed. Additionally, in following sections a sediment TMDL is proposed for Three Creek. It is expected, due to the relationship of TP and TSS, that as sediment is decreased TP will also decrease. Therefore, the future need of a nutrient TMDL is in question.

The tributary to Wickahoney Creek, a free flowing stream, exceeded the instantaneous nutrient guideline once in six months. However, other measures used to corroborate a nutrient problem in the creek, such as low DO and elevated pH, did not exceed state water quality standards. Due to the single exceedance and no corroboration with other numeric standards a nutrient TMDL will not be completed. However, further monitoring of the nutrients of the tributary is proposed. The data collected for this SBA-TMDL and future monitoring of the nutrients in the tributary will be used in upcoming listing cycles of the §303(d) list. Following the inclusion on the water quality limited list provided to USEPA a nutrient TMDL will be completed on the Wickahoney tributary.

B. Sediment and Settable Solids

Sediment is the most common listed pollutant in the Bruneau River Reach. It is a pollutant on all water bodies in this subbasin listed in 1998. Sediment impacts the aquatic life beneficial uses by smothering fish spawning and rearing grounds, leading to a homogenization of available habitats. Additionally, it reduces the available habitats for the food organisms of the fishes, as well as smothering the food organisms themselves (IDHW 1991). In addition, increased sedimentation leads to a loss of juvenile rearing and over-wintering habitat. As water temperatures decline in the winter, juvenile salmonids seek interstitial spaces in the substrate where they become torpid. When sediment fills the interstitial spaces, it leaves the juvenile fish with no cover during this period of inactivity and makes them more vulnerable to predation. Furthermore, the most common nonpoint pollutant in the state of Idaho is sediment (IDHW 1989), and the dominant portion of sediment loads in southern Idaho is suspended sediment (IDHW 1989).

The IDAPA criteria for suspended sediment are narrative. Therefore, other sources were reviewed to determine appropriate limits and targets for suspended sediment. Suggested limits for suspended sediment have been developed by the European Inland Fisheries Advisory Commission and the National Academy of Sciences and adopted by the state of Idaho in previous TMDLs. A limit of 25 mg/L total suspended sediment (TSS) would provide a high level of protection of the aquatic organisms; 80 mg/L TSS moderate protection; 400 mg/L TSS low protection and over 400 mg/L TSS very low protection (USFS 1990; Thurston et al. 1979). IDEQ Program managers have proposed a target of suspended solids not to exceed a monthly average of 50 mg/L TSS with a daily maximum of 83 mg/L TSS to allow for natural variability due to storm and seasonal runoff events. All systems within the subbasin will be assessed using the 50 mg/L TSS monthly average and 83 mg/l TSS daily maximum guidelines.

Bedload sediment also impairs the beneficial uses of some streams in the subbasin. In order to restore the beneficial uses, reduction in both the suspended and bedload sediments needs to occur. However, guidelines or recommendations for other components of sediment are lacking. In other cases the ability to correctly monitor bedload or washload is limited by the short time lines under which the Bruneau River SBA-TMDL must be completed. In order to over come these shortcomings IDEQ-TFRO has developed two methods to address sediment. The first of these is by using other streams in the subbasin to set the guidelines and recommendations for sediment targets. Streams in which the beneficial uses are supported will be surveyed to determine appropriate sediment targets and establish criteria to compare the §303(d) listed waterbodies. The rational is that if the beneficial uses in the other stream are fully supported, then the sediment impaired streams should have goals to meet a similar percent surface fines as well as the TSS guidelines. This approach will be used to set targets and determine appropriate reductions for the TMDL

The second approach was to use a GIS platform and aerial photo interpretation to establish the levels of sediment and nutrient export from the system. In a previous study, export coefficients were established for sediment and phosphorus loads. This approach is under development and may be used to assist the local stakeholders with implementation of the TMDL.

In the IDEQ data set only Jacks Creek exceeded the monthly average TSS guideline (50 mg/L). This occurred in the June sampling events. Additionally, Jacks Creek and Clover Creek had exceedances of the instantaneous TSS guideline (83 mg/L). These occurred in May for Jacks Creek and August for Clover Creek. However, it should be noted that the Clover Creek site did not exceed the monthly average guideline for the month of August and the single event was anomalous with the other 23 sampling events on Clover Creek.

C. Dissolved Oxygen

Dissolved oxygen is a typical concern in systems with excess nutrients or other sources of organic enrichment. IDAPA §58.01.02.200.07 in general states that surface waters of the state shall be free from oxygen-demanding materials in concentrations that would result in an anaerobic water condition. Additionally, numeric water quality standards set the lowest level of DO concentrations at not less than six mg/L for cold water biota, seasonal cold water biota, and salmonid spawning. The DO level has been set at not less than 5 mg/L for warm water biota. During daylight conditions, these standards are rarely exceeded due to the respiration of aquatic plants, unless large amounts of oxygen demanding materials are present. However, during nighttime periods, systems with large quantities of aquatic plants will exceed the biota standards and in some cases may go anaerobic. As a result, diel studies of the dissolved oxygen concentrations are required. Low DO directly affects the beneficial uses stressing the organisms and increasing their chances of mortality. In cases of long periods of anaerobic conditions catastrophic fish kills are common. In the macroinvertebrate community the assemblages are more dominated by diptera and other tolerant taxa.

Fish kills have not been noted on any of the listed streams in the subbasin. Additionally, macroinvertebrate analysis indicated that the communities contain taxa intolerant to organic enrichment and the resulting low DO. Jacks Creek is the only stream in the subbasin that is listed for DO problems. Day-time DO levels never fell below 7 mg/L in Jacks Creek. Diel DO measurements are not available at this time for Jacks Creek.

D. Bacteria

IDAPA §58.01.02.251.01 states that waters designated for primary contact recreation are not to contain *Escherichia coli* (*E. coli*) bacteria significant to the public health in concentrations exceeding:

A single sample of four hundred six (406) organisms per 100 ml; or

A geometric mean of one hundred twenty-six (126) organisms per 100 ml based on a minimum of five (5) samples taken every three to five days over a 30 day period.

For waters designated for secondary contact recreation according to IDAPA §58.01.02.251.02 the criteria state that waters are not to contain *E. coli* bacteria significant to the public health in concentrations exceeding:

A single sample of five hundred seventy-six (576) organisms per 100 ml; or

A geometric mean of one hundred twenty-six (126) organisms per 100 ml based on a minimum of five (5) samples taken every three to five days over a 30 day period.

The state has interpreted these standards to mean that the instantaneous standard is used to determine if further monitoring is required. If at such time the geometric mean standard is exceeded then a water quality violation has occurred.

Although Hot Creek is the one segment listed for pathogens, IDEQ has collected bacteria samples on all the listed waterbodies in the subbasin. Hot Creek has not exceeded the bacteria standards for either primary or secondary recreation. Jacks Creek and Clover Creek consistently exceeds the geometric mean standard for both primary and secondary contact recreation. Wickahoney Creek exceeded the instantaneous standard for both primary and secondary contact recreation. Follow up monitoring was limited to the Wickahoney tributary due to zero flow in the Creek itself. The tributary did not exceed the geometric mean bacteria standards for recreation therefore no bacteria standard exceedances occurred.

E. Temperature

Applicable water quality standards for cold water biota relating to temperature can be found in IDAPA §58.01.02.250.02.b which states that waters cannot exceed an instantaneous water temperature of 22 °C and a daily mean of no greater than 19EC. For warm water biota (IDAPA §58.01.02.250.04.b), the standards are less than 33EC instantaneous water temperature and not greater than a daily mean of 29EC.

Temperature, under the current standards, is a minor problem in some segments of the Bruneau River Subbasin. However, this is generally considered by the residents of the Bruneau area to be a natural problem. These temperature exceedances may be a natural problem in some segments of the Bruneau subbasin due to the geothermal springs that serve as a significant portion of the discharge during low water seasons and years. Additionally, in other areas of the state bioassessment data conflicts with concurrent temperature information and water quality standards. This is likely the result of the state's current water quality standards being derived from an outdated understanding of the cold water biota's temperature requirements. Consequently, IDEQ is participating in a regional review of temperature criteria, which is being organized by USEPA Region 10. Following the conclusion of the temperature review, temperature exceedances in the Bruneau River Subbasin will be reassessed and, if needed, a temperature TMDL will be completed.

F. Flow Alteration

There are currently no water quality standards, either narrative or numeric, which address flow alteration. Additionally, it is IDEQ policy, with concurrence with USEPA, that flow and habitat alteration are pollution and therefore not a "TMDLable" pollutants. These forms of pollution will remain on the §303(d) list of the Clean Water Act. Furthermore, the estimation of load capacity and load allocations for flow alteration is not practical. Due to these constraints, a TMDL for flow alteration will not be completed for the segments listed for flow alteration in the Bruneau subbasin.

2.4 Analysis of Existing Water Quality Data

The Bruneau River Subbasin has been viewed by many as one of the last vast untouched regions of the state. Still others view the area as highly degraded with stream courses out of balance with the natural desert setting. It is the goal of the SBA-TMDL to dispel with the hyperbole surrounding both views of the basin, and to dispassionately present an analysis of the existing water quality in the §303(d) listed waterbodies. The analysis will be focused on the current information available, as past and historic information is limited. Figure 20 shows the locations of IDEQ water quality sampling locations throughout the subbasin. Appendix A. contains the data collected by IDEQ in the various §303(d) listed streams and rivers within the Subbasin.

2.4.1 Bruneau River

Water quality samples located within the listed segment of the Bruneau River are rare. Upon a review of the STORET database, no samples from the river could be found. However, there are numerous samples taken from wells surrounding the area. IDEQ has sampled in the river over the course of 2000. Due to the limited number of sampling periods in the data set, IDEQ's confidence in monthly average concentrations was low. In most cases two samples were the most collected in any given month. More commonly a single sample was collected for any given month. This sampling design was intended to determine annual load. Additionally, the annual load estimated by this type of design would over estimate annual load by 25 to 50 percent (Robertson and Richards 2000). However, to assist in the determination of seasonal components and appropriate critical conditions the data will be presented as monthly averages in following tables while annual averages are presented in the text.

For the Bruneau River two sample locations were set up with sampling beginning in April of 2000 (see Figure 20). The upstream site was used to determine background concentrations and loads from the upstream, full support, segments of the river. The lower site was used to determine the percent change in concentrations and loads due to activities along the reach.

At the uppermost site, near the confluence of Hot Creek, chemical constituents had very low concentrations. These concentrations were reflective of the state of the river in the upstream canyons. Limited use occurs throughout most of the river, thus creating low concentrations of the measured constituents. For example, the average TP concentration was 0.018mg/L (n = 14) with a standard deviation of 0.013 mg/L. The maximum measured concentration at this site was 0.046 mg/L. Total suspended sediment was also very low, with an average of 4 mg/L, a standard deviation of 6 mg/L, and a maximum of 17 mg/L. All of the samples included periods of high runoff as well as summer minimum flow periods. Table 12 shows the other measured constituents. These numbers clearly demonstrate within the limits of the sampling population that the upper reaches of the river are not water quality limited and will serve as a reference for other nutrient and bioassessment studies in the SBA-TMDL.

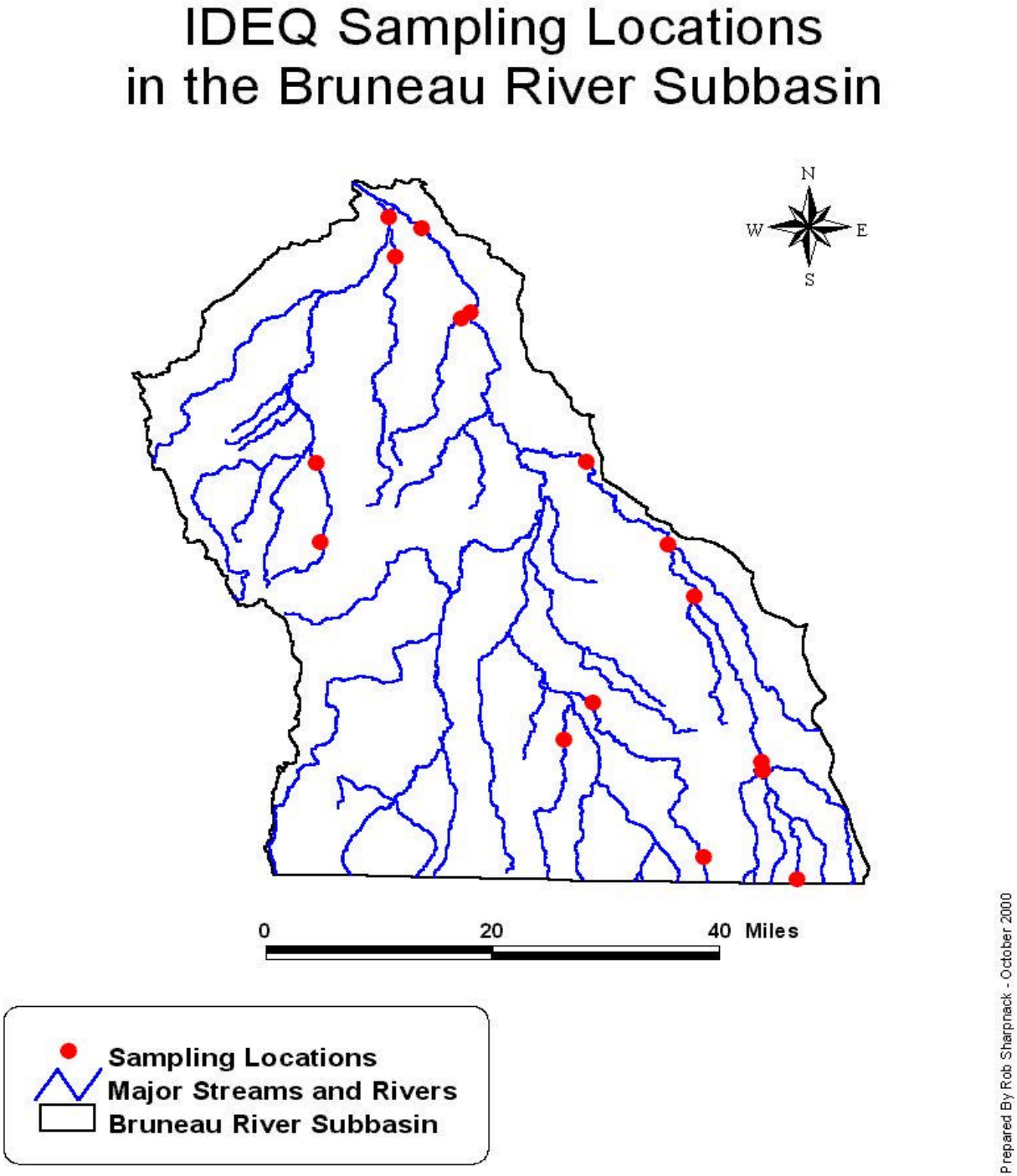


Figure 20. IDEQ Sampling Locations in the Bruneau River Subbasin

Table 12. MEASURED CONSTITUENTS IN THE UPPER REACHES OF THE BRUNEAU RIVER

Month	Number of Samples	TSS mg/L	Total NH_3 as N mg/L	TKN mg/L	Total NO_2 + NO_3 as N mg/L	Total P mg/L	Turbidity NTU	Bacteria E. Coli Col/100ml
January	0							
February	0							
March	0							
April	1	17	0.012	0.34	0.024	0.046	5.5	
May	1	10	0.008	0.29	0.02	0.029	4.2	3
June	2	9	0.01	0.19	0.028	0.03	3	3
July	2	2	0.011	0.18	0.094	0.012	0.66	4
August	3	1	0.010	0.16	0.185	0.011	1.58	2
September	1	1	0.013	0.09	0.17	0.009	0.4	2
October	2	1	0.008	0.12	0.151	0.005	0.6	
November	1	1	0.005	0.11	0.119	0.01	0.1	
December	0							
Annual Average		4	0.010	0.18	0.106	0.018	1.9	3

At the lower sampling location (Table 13), the effects of agriculture and other land uses can be seen in an increase in most of the above measured constituents. It should be noted; however, that these increases in most cases are of a small magnitude. For example, TSS increases slightly in the lower reaches. The average increase is from 4 mg/L at the upper end of the reach to 8 mg/L at the lower end. These downstream samples were taken in the same day as the upstream samples and indicate the critical period is during summer and fall low flow in this one year effort. TP increased more dramatically than did suspended sediments. The increase was from an average of 0.018 mg/L to 0.084 mg/L average, with a standard deviation of 0.048. The minimum measured concentration was 0.033 mg/L in early June and the maximum of 0.2 mg/L in the middle of August. This appears to indicate that the phosphorus source is coming from non-sediment associated sources, such as animal concentrations, rather than from fertilizer applications and runoff from agriculture fields. However, if this were the case then one would expect a large magnitude change in bacteria concentrations as well. Such a change can be seen in the lower site sampling record. Bacteria counts are nearly an order of magnitude higher, supporting the hypothesis that the TP increases are from animal sources next to the river. Further validation of this hypothesis will occur as more animals are moved to winter pastures along the river as irrigated crop production decreases. IDEQ expects that the TP levels will continue to increase along with bacteria levels while sediment numbers will drop to levels even closer to the upper reach or at least remain within the current range of <1 to 27 mg/L.

Table 13. MEASURED CONSTITUENTS IN THE LOWER REACHES OF THE BRUNEAU RIVER.

Month	Number of Samples	TSS mg/L	Total NH_3 as N mg/L	TKN mg/L	Total NO_2 + NO_3 as N mg/L	Total P mg/L	Turbidity NTU	Bacteria E. Coli Col/100ml
January	0							
February	0							
March	0							
April	1	27	0.017	0.32	0.036	0.06	6.2	
May	1	17	0.018	0.34	0.041	0.041	5.6	26
June	2	13	0.012	0.29	0.025	0.042	5.3	43
July	3	4	0.035	0.42	0.007	**0.077**	1.5	72
August	3	5	0.020	0.81	0.005	**0.137**	3.6	62
September	1	4	0.024	0.50	0.009	0.057	3.0	36
October	2	5	0.021	0.51	0.011	**0.103**	2.3	
November	1	3	0.006	0.23	0.147	0.021	0.6	
December	0							
Annual Average		8	0.020	0.45	0.024	0.080	3.0	67

Note: water quality standards violations or guideline exceedances are in bold face.

Due to IDEQ's limited sampling for suspended sediments in the Bruneau River system additional measures were taken to determine if other forms of sediment were impairing the beneficial uses. To this end, a series of Wolman pebble counts were conducted at the lowermost sampling location. These Wolman pebble counts were conducted to determine if bedload sediment could be impairing the beneficial uses. From IDEQ's sampling regime, it was determined that the suspended fraction of the sediment load was not impairing the uses. Following the BURP protocols, Wolman pebble counts were conducted in approximately three km reach of the Bruneau River. Counts were conducted from bankfull edge to bankfull edge until at least fifty measurements were taken. Following this, the BURP crew would travel upstream approximately 100 m to another riffle. This was repeated until the crew had collected 30 series of Wolman pebble counts. To allow a comparison with the listed water body, a similar system (one that the beneficial uses have been documented as being fully supported) was chosen from the general area of the §303(d) listed water body. In this case Sheep Creek was chosen as the comparison stream. Sheep Creek was assessed for exclusion or inclusion on the 1998 §303(d) list. It was removed from the list in 1998 because it was determined that the beneficial uses were fully supported. Wolman pebble counts were conducted on Sheep Creek in a similar manner over a two-mile reach of the lower portion of the creek.

IDEQ-TFRO's surrogate for bedload is percent surface fines as defined by Wolman pebble counts. To determine if the percent surface fines between the two streams were significantly different, a paired t-test analysis was completed. The test indicated that the percent surface fines between the fully supported water body and the Bruneau River were not significantly different (p = 0.996). As a result of the TSS samples collected and the high correlation between the percent fines of the two streams, IDEQ has determined that sediment in either the suspended form or as measured by the percent surface fines surrogate are not impairing the Bruneau River.

It appears from the data that sediment is within the bounds of water quality determined to be supportive of the designated beneficial uses, while the amount of TP in the river is in excess of the standards and guidelines for supporting the same beneficial uses. Therefore, IDEQ will need to determine the appropriate critical periods, targets, margins of safety, and allocations for the Bruneau River and TP. Consequently, IDEQ will not complete a sediment TMDL on the river and will delist this segment for sediment. However, a TP reduction TMDL will be completed for the Bruneau River.

2.4.2 Jacks Creek

Water quality samples located within the listed segment of Jacks Creek are rare. After a review of the STORET database no samples from the creek could be found. However, there are numerous samples taken from geothermal wells surrounding the area. IDEQ has sampled in the creek over the course of 2000. Due to the limited number of sampling periods in the data set, IDEQ's confidence in monthly average concentrations was low. In most cases two samples were the most collected in any given month. More commonly a single sample was collected for any given month. This sampling design was intended to determine annual load. Additionally, the annual load estimated by this type of design would over estimate annual load by 25 to 50 percent (Robertson and Richards 2000). However, to assist in the determination of seasonal components and appropriate critical conditions the data will be presented as monthly averages in following tables while annual averages are presented in the text. One sample location was set up on Jacks Creek (see Figure 20) with sampling beginning in April of 2000. As the entire water body was listed as water quality limited only the most downstream location was chosen. The sampling location would capture all of the impacts from the entire watershed.

At the sampling location, the effects of land uses can be seen in elevated levels of the measured constituents (Table 14) in comparison to those levels measured in the Bruneau River near Hot Creek, a chemical reference area. These increases in all most all cases are of a large magnitude, indicating much higher use and degradation. For example, TSS in Jacks Creek averages 40 mg/L (standard deviation 28 mg/L), which is considerably higher than the Bruneau upper site. These samples were taken in the same day as the Bruneau River samples and includes the critical periods of springtime high flows and summertime low flows. TP increased more dramatically than did suspended sediments. At Jacks Creek the average TP concentration was 0.187 mg/L (standard deviation 0.063 mg/L), while at the Bruneau River the average TP concentration was 0.018 mg/L average. The minimum measured TP concentration at Jacks Creek was 0.102 mg/L in early July and the maximum was 0.302 mg/L in early June. Both TP and TSS concentrations fell dramatically as the year progressed. This corresponded to an observed movement of cattle from pastures located adjacent to the stream. However, TP concentrations remain at very high levels. TSS concentrations fell below target levels (50 mg/L) set in other TMDLs in approximately July.

Bacteria concentrations were also extraordinarily high in the spring and decreased somewhat as the year progressed. Yet, bacteria counts at the last sampling date still exceeded state water quality standards. The inferences IDEQ draws from this data is that the phosphorus source is coming from non-sediment associated sources (such as animal concentrations) rather than from fertilizer applications and runoff from agriculture fields. Further validation of this hypothesis will occur as more animals are moved to winter pastures along the creek as irrigated crop production decreases. IDEQ expects that the TP levels will continue to remain at elevated levels along with bacteria levels while sediment numbers will continue to drop.

Table 14. MEASURED CONSTITUENTS IN JACKS CREEK

Month	Number of Samples	TSS mg/L	Total NH_3 as N mg/L	TKN mg/L	Total NO_2 + NO_3 as N mg/L	Total P mg/L	Turbidity NTU	Bacteria E. Coli Col/100ml
January	0							
February	0							
March	0							
April	1	73	0.019	0.980	1.710	**0.244**	19.0	
May	1	**96**	0.033	1.120	1.880	**0.296**	26.0	2400
June	2	**63**	0.031	1.035	1.560	**0.256**	14.8	815
July	2	12	0.021	0.695	1.705	**0.122**	2.6	730
August	3	20	0.034	1.083	3.303	**0.155**	3.7	1117
September	1	26	0.035	1.000	3.090	**0.225**	5.7	510
October	2	38	0.054	0.825	2.960	**0.237**	9.0	
November	1	44	0.051	0.890	2.910	**0.250**	6.2	
December	0							
Annual Average		40	0.035	0.95	2.458	**0.187**	9.3	806*

Note: water quality standards violations or guideline exceedances are in bold face. * Geometric mean for August.

It appears from the data that sediment is within the bounds of water quality determined to be supportive of the designated beneficial uses in most months, while the amount of TP in the creek is in excess of the standards and guidelines for supporting the same beneficial uses. Bacteria counts are also above threshold values indicating the recreation beneficial uses may not be supported. Further sampling was done to collect enough samples to apply the geometric mean water quality standard (126 coliform forming units (cfu)/100 ml). These samples (682, 806, and 474 cfu/100ml) clearly show that secondary contact recreation is not supported. Therefore, IDEQ will need to determine the appropriate critical periods, targets, margins of safety, and allocations for bacteria, sediment, and TP in Jacks Creek. The TP reduction TMDL will be used as the Dissolved Oxygen (DO) TMDL and sediment TMDL due to a reduction in nuisance aquatic plant growth correlated to reductions in TP and a strong correlation ($p < 0.0002$, $R^2 = 0.749$) with TSS and TP (Figure 21.).

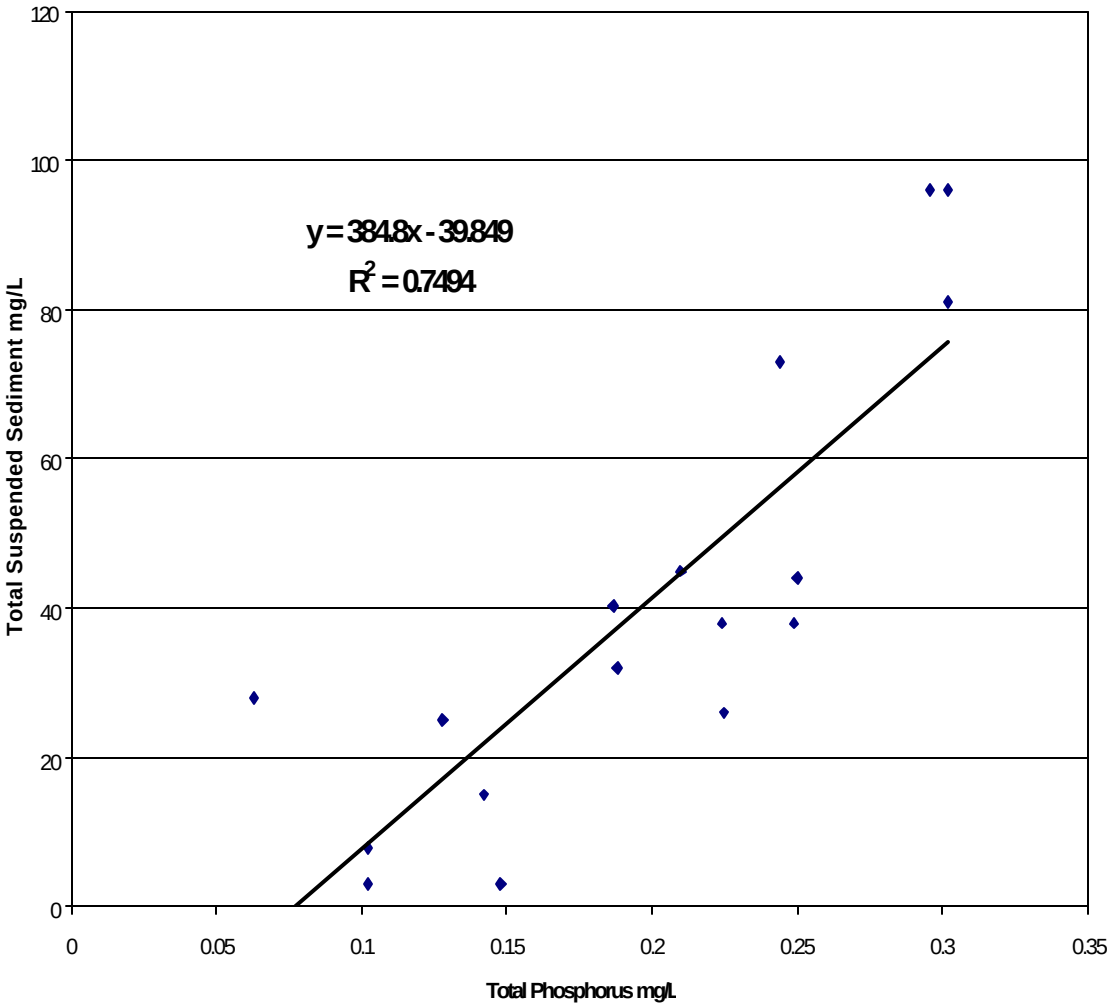


Figure 21. TP TSS relationship in Jacks Creek

2.4.3 Sugar Creek

Water quality samples were not collected in Sugar Creek due to the fact that it was dry. Sampling was attempted in late April 2000 during high water runoff for most of the subbasin. At that time Sugar Creek was little more than a trickle. Due the listing error described in other sections of this document, IDEQ will remove it from the §303(d) list and will not complete a TMDL for sediment for the creek. However, Sugar Valley Wash will be incorporated into the TMDL for Jacks Creek via the river corridor approach.

2.4.4 Wickahoney Creek

Water quality samples were taken from two locations on and near Wickahoney Creek. The first of these was located in the canyon near the confluence of Big Jacks Creek. This was the most downstream site on the creek. As the entire water body was listed as water quality limited, only the most downstream location was chosen. The sampling location will capture all of the impacts from the entire watershed. An upper sampling site was located on the spring source tributary to the creek and serves as a background point. In the eyes of the local residents, Wickahoney Creek does not exist above the confluence with this spring fed tributary. Wickahoney Creek was in fact dry above this confluence in 2000. Additionally, it appeared that flows in the bed above the confluence had not occurred in that year. This indicates that Wickahoney Creek, above the spring tributary, is an ephemeral channel. Following the first week of July, samples were only collected in the tributary as the whole of Wickahoney Creek was dry, which indicates that the creek is intermittent. Furthermore, monitoring observations indicate that discharge from the spring tributary was not reaching the confluence area of Wickahoney Creek at this time as well because the stream's water was evaporating or subbing out. Due to the limited number of sampling periods in the data set, IDEQ's confidence in monthly average concentrations was low. In most cases two samples were the most collected in any given month. More commonly a single sample was collected for any given month. This sampling design was intended to determine annual load. Additionally, the annual load estimated by this type of design would over estimate annual load by 25 to 50 percent (Robertson and Richards 2000). However, to assist in the determination of seasonal components and appropriate critical conditions the data will be presented as monthly averages in following tables while annual averages are presented in the text.

While discharge in Wickahoney was occurring, most constituents were at or near water quality standards or guidelines suggested by USEPA (see Table 15). For example, average TSS concentrations were 19 mg/L (standard deviation 31 mg/L). This value indicates that sediment may not be the factor impairing beneficial uses. Average TP concentrations are slightly higher than USEPA guidelines (0.100mg/L) at 0.106 mg/L (standard deviation 0.098 mg/L). The average TP values were highly influenced by the last sample collected while discharge was occurring. It should be noted; however , that discharge at this time (0.001 cms) was at a level below which Idaho water quality standards do not apply (0.03 cms). If this outlier were excluded, average TP concentrations would have been 0.064 mg/L. Additionally, TSS was often low while TP concentrations were high. During the last sampling event while discharge was occurring in the creek, TSS and TP were extremely high. These points were exclude from the analysis, since discharge was negligible and did not meet the 0.03 cms criteria in the state water quality standards.

Bacteria contamination was also occurring on and off during the sampling period. However, no correlation could be made with bacteria counts and TP or TSS concentrations. Only instantaneous standards could be applied to the data as the creek went dry before the geometric mean samples could be collected. Although the water quality standards require a geometric mean to be calculated before a violation can be documented, IDEQ-TFRO will assume that the bacteria counts in Wickahoney Creek are correlated with the bacteria counts in the tributary waters (the tributary is the major source of late season water for Wickahoney Creek). Both systems were sampled on the same days (when discharge was occurring in Wickahoney Creek). These samples are very similar. Additionally, both systems had an instantaneous sample violation at approximately the same time.

Table 15. MEASURED CONSTITUENTS IN WICKAHONEY CREEK

Month	Number of Samples	TSS mg/L	Total NH_3 as N mg/L	TKN mg/L	Total NO_2 + NO_3 as N mg/L	Total P mg/L	Turbidity NTU	Bacteria E. Coli Col/100ml
April	0							
June 98	2	9	0.008	.0450	0.010	0.093		
May 00	2	2	0.014	0.250	0.003	0.041	4.3	365
June 00	2	45	0.038	0.795	0.014	0.178*****	6.7	502
July 00	1							24
Average		19	0.022	0.51	0.008	0.064	5.5	

Note: water quality standards violations or guideline exceedances are in bold face. * Water Quality standards do not apply.

It appears from the data that suspended sediment and nutrients are within the bounds of water quality determined to be supportive of the designated beneficial uses.

Due to IDEQ's limited sampling for suspended sediments in the Wickahoney Creek system, additional measures were taken to determine if other forms of sediment were impairing the beneficial uses. To this end, a series of Wolman pebble counts were conducted at the lowermost sampling location. These Wolman pebble counts were conducted to determine if bedload sediment could be impairing the beneficial uses. From IDEQ's sampling regime it was determined that the suspended fraction of the sediment load was not impairing the uses. Following the BURP protocols, Wolman pebble counts were conducted on riffles in the lower reaches of Wickahoney Creek. Counts were conducted from bankfull edge to bankfull edge until at least fifty measurements were taken. Following this, the crew would travel upstream approximately 100 m to another riffle. This was repeated until the crew had collected 30 series of Wolman pebble counts (approximately three-km of the creek). To allow a comparison with the listed water body, a similar system (one that the beneficial uses have been documented as being fully supported) was chosen from the general area of the §303(d) listed water body. In this case, Trout Creek was chosen. Trout Creek was assessed for exclusion or inclusion on the 1998 §303(d) list. It was not added to the list in 1998 because it was determined that the beneficial uses were fully supported. Wolman pebble counts were conducted on Trout Creek in a similar manner over a three-km reach of the lower portion of the creek.

To determine if the percent surface fines, IDEQ-TFRO's surrogate for bedload, between the two streams were significantly different, a paired t-test analysis was completed. The test indicated that the percent surface fines between the fully supported water body and Wickahoney Creek were not significantly different ($p = 0.106$). As a result of the TSS samples collected and the high correlation between the percent fines of the two streams, IDEQ has determined that sediment in either the suspended form or as measured by the percent surface fines surrogate are not impairing Wickahoney Creek. Therefore, IDEQ will not complete a sediment TMDL on the creek and will delist this segment for sediment.

Single bacteria samples for each system; however, were above threshold values indicating the recreation beneficial uses may not be supported. To determine if secondary contact recreation is supported, IDEQ used the bacteria samples for the unnamed tributary to calculate the geometric mean standard for the Wickahoney system (including the tributary source and the named portion of the creek). Those additional samples indicate that Wickahoney Creek and its tributary system are supporting secondary contact recreation beneficial uses. Therefore, IDEQ will not complete a bacteria TMDL on the creek. Furthermore, TP or other nutrient TMDLs also will not be required for Wickahoney Creek.

Samples taken at in the tributary to Wickahoney Creek would indicate and support the conclusion drawn in previous sections of this document that the beneficial uses are fully supported. Suspended sediment and nutrients were below levels associated with degraded beneficial uses (Table 16). However, a single bacteria count indicated that recreational beneficial uses might be impaired on the tributary. Additional samples were collected to determine if secondary contact recreation was supported. The geometric mean was calculated from five additional samples collected within a thirty-day period. The geometric mean was 108 cfu/100 ml. This value is below the 126 cfu/100ml in the water quality standards. Therefore, a bacteria TMDL will not be completed for the tributary.

In addition one exceedance of the instantaneous nutrient guideline (0.160 mg/L TP) occurred in September (0.171 mg/L TP). However, other factors which would corroborate the exceedance of nuisance aquatic vegetation standard exceedance do not occur. For example DO levels never falls below 6.4 mg/L, and pH never goes below 7.77 and never above 8.64. Additionally, there are no visible slime growths or large mats of macrophytes. Furthermore, the aquatic biota are present in sufficient numbers to allow IDEQ to make full support status calls for cold water biota and salmonid spawning. As a result, IDEQ will not proceed with a nutrient TMDL for the tributary. However, as additional data is available IDEQ will reassess the status of the beneficial uses for upcoming §303(d) lists.

Table 16. MEASURED CONSTITUENTS IN THE TRIBUTARY TO WICKAHONEY CREEK

Month	**Number of Samples**	**TSS mg/L**	**Total NH_3 as N mg/L**	**TKN mg/L**	**Total NO_2 + NO_3 as N mg/L**	**Total P mg/L**	**Turbidity NTU**	**Bacteria E. Coli Col/100ml**
May	1	31	0.022	0.350	0.568	0.096	9.6	120
June	2	15	0.045	0.400	0.594	0.087	6.8	**920**
July	1							290
August	3	29	0.025	0.310	0.457	0.098	9.0	108*
September	1	62	0.030	0.430	0.783	**0.171**	15	
October	2	30	0.023	0.270	0.826	0.098	12.5	
November	1	10	0.013	0.160	0.858	0.070	3.9	
Average		29	0.026	0.31	0.647	0.102	9.7	

Note: water quality standards violations or guideline exceedances are in bold face. * Geometric mean for August.

2.4.5 Hot Creek

Few, if any differences exist in the measured constituents from Hot Creek and the upper site of the Bruneau River. The exceptions are nitrate plus nitrite and bacteria. The parameters are higher in the stream than in the river. The NO_2+NO_3 (NO_x) as N elevation is as expected. The majority of water in Hot Creek is from groundwater sources. Hot Creek has been listed for sediment and bacteria. Measurements of suspended sediments are very low. The average TSS concentrations in the creek are 3 mg/L (standard deviation 4 mg/L). In addition, bacteria counts are below state standards, although slightly elevated in comparison to the river. TP concentrations are also very low (see Table 17). Reports from Idaho State University concerning the Bruneau Hot Springsnail have indicated that the populations are being impaired by sediment spates (slugs of sediment delivered from random and infrequent precipitation events). A TMDL would not alleviate the occurrence of such spates, especially considering the quality of the water at other times of years. Additionally, USFWS, USBLM, and local landowner agreements are currently in place to exclude grazing in the Indian Bathtub area. By excluding grazing in the area the riparian vegetation of

Hot Creek should be better able to handle any future spate. Furthermore, a TMDL is not designed to rectify rare occurrences such as those cited in the snail reports. Therefore, based on the water chemistry samples collected that indicate the landowner/BLM partnership is working and the rarity of the sediment events, IDEQ will not complete a TMDL for either sediment or bacteria on Hot Creek and will de-list Hot Creek for both sediment and bacteria. At such time that the landowner/BLM partnership should cease then IDEQ will reassess the current water quality conditions and the need for a TMDL.

Table 17. MEASURED CONSTITUENTS IN HOT CREEK

Month	Number of Samples	TSS mg/L	Total NH_3 as N mg/L	TKN mg/L	Total NO_2 + NO_3 as N mg/L	Total P mg/L	Turbidity NTU	Bacteria E. Coli Col/100ml
June	1	0	0.003	0.025	0.673	0.029	0.4	45
July	2	1	0.005	0.063	0.685	0.017	0.4	56
August	3	7	0.007	0.255	0.633	0.053	1.4	5
September	1	0	0.011	0.025	0.678	0.016	0.4	44
October	2	3	0.003	0.063	0.713	0.013	0.5	
November	1	2	0.016	0.060	0.714	0.014	0.7	
Average		3	0.007	0.11	0.676	0.028	0.8	32

Note: water quality standards violations or guideline exceedances are in bold face.

All of the measured constituents are of such low values that no further monitoring efforts, such as Wolman pebble counts, have been expended on Hot Creek. Additionally, Hot Creek may be one of the only thermal spring source streams in the area. Although many thermal springs exist, most of these discharge into a river or stream. Finding a stream with a thermal spring as the sole source of water with documented fully supported beneficial uses could not be done for the needed percent surface fines comparison. Consequently, IDEQ will delist the stream for all of the pollutants based on the monitoring data collected and presented above and on the basis that BMPs have been put in place on Hot Creek thanks to a cooperative agreement with the USBLM, USFWS and the local landowner that have proactively achieved water quality standards before the TMDL was initiated.

2.4.6 Clover Creek

Water quality samples were taken at three locations on Clover Creek. The upper most of these was located near the confluence with Three Creek. This site is in the headwaters of the creek. This sampling location would capture all of the impacts from the entire watershed above the listed segment of Clover Creek including two unlisted tributaries and one listed water body. A second sampling location was set up in the lower bounds of the creek. However, midway through the summer season this site went dry. Subsequently the lower site was moved upstream until water was again located within the streambed. Because the stream below the middle location was dry, any subsequent TMDLs will have to be based on the data from the middle location.

While discharge at the lower most site was occurring most constituents were at or near water quality standards or guidelines suggested by USEPA. For example, maximum TSS concentrations were 2 mg/L. This value indicates that sediment may not be the factor impairing beneficial uses. Maximum TP concentrations were slightly lower than USEPA guidelines (0.1 mg/L monthly average TP) at 0.07 mg/L. The lower most site went dry in the middle of July consequently only two data points are available for this lower site (one in June and one in July).

Water quality constituents at the middle location were similar to those collected at the lower site. As a result, IDEQ infers that the middle location is representative of the water quality in the lower segment when water is present in the lower segment. At this location average TSS concentrations were 15 mg/L (standard deviation 26 mg/L). Turbidity was also very low; the average turbidity was 6.7 nepholometric turbidity units (NTUs). This data indicates that suspended sediment are not impairing the beneficial uses. Most other constituents measured at this location were also below any standard or suggested guideline. For example, TP concentrations averaged 0.080 mg/L.

Due to IDEQ's limited sampling for suspended sediments in the Clover Creek system additional measures were taken to determine if other forms of sediment were impairing the beneficial uses. From IDEQ's sampling regime, it was determined that the suspended fraction of the sediment load was not impairing the uses. Therefore, a series of Wolman pebble counts were conducted at the middle sampling location. These Wolman pebble counts were conducted to determine if bedload sediment could be impairing the beneficial uses. Following the BURP protocols, Wolman pebble counts were conducted on riffles in a three-km reach of Clover Creek. Counts were conducted from bankfull edge to bankfull edge until at least fifty measurements were taken. Following this the crew would travel upstream approximately 100 m to another riffle. This was repeated until the crew had collected 30 series of Wolman pebble counts (approximately 3.25 km of the creek). A similar system (one that the beneficial uses have been documented as being fully supported) was chosen from the general area of the §303(d) listed water body. In this case, Big Flat Creek was chosen for comparison with Clover Creek. Big Flat was removed from the §303(d) list in 1998 because it was determined that the beneficial uses were fully supported. Wolman pebble counts were conducted on Big Flat Creek in a similar manner over a three-km reach of the lower portion of the creek.

To determine if the percent surface fines (IDEQ-TFRO's surrogate for bedload) between the two streams were significantly different, a paired t-test analysis was completed. The test indicated that the percent surface fines between the fully supported water body and Clover Creek were not significantly different ($p = 0.839$).

As a result of the TSS samples collected and the high correlation between the percent fines of the two streams, IDEQ has determined that sediment in either the suspended form or as measured by the percent surface fines surrogate are not impairing Clover Creek.

However, bacteria counts exceeded both the instantaneous and geometric mean calculation at both the upper and middle sampling locations. At the middle location a count of 2100 cfu/100ml was measured. Following the protocol outlined in the state water quality standards additional samples were collected to determine if the recreational beneficial uses were supported or not. It was determined from the geometric mean of the samples from the middle location (447 cfu/100ml) that the secondary contact recreation water quality standard was exceeded.

Samples taken in the headwaters area of Clover Creek indicate and support the conclusions drawn from the middle location. These conclusions were that the beneficial uses are fully supported except secondary contact recreation. It can also be inferred that the tributaries are not impairing the beneficial uses in Clover Creek. Suspended sediment and nutrients in the headwaters were below levels associated with degraded beneficial uses (see Table 18a and 18b).

Table 18a. MEASURED CONSTITUENTS AT A MIDDLE LOCATION ON CLOVER CREEK

Month	Number of Samples	TSS mg/L	Total NH_3 as N mg/L	TKN mg/L	Total NO_2 + NO_3 as N mg/L	Total P mg/L	Turbidity NTU	Bacteria E. Coli Col/100ml
May	2	5	0.021	0.510	0.003	0.081		22
June	1	4	0.016	0.420	0.003	0.048	0.3	
July	1	6	0.040	0.890	0.031	0.095	3.8	100
August	3	34	0.096	0.873	0.031	**0.128**	12.3	**2100 max**
September	1	6	0.034	0.550	0.028	0.063	6.2	**1600 max**
October	2	16	0.019	0.465	0.020	0.046	6.3	
November	1	4	0.009	0.250	0.005	0.035	0.8	
Average		15	0.042	0.61	0.019	0.080	6.7	**528***

Note: water quality standards violations or guideline exceedances are in bold face. * Geometric mean for mid August through mid September.

Table 18b. MEASURED CONSTITUENTS IN THE HEADWATERS AREA OF CLOVER CREEK

Month	Number of Samples	TSS mg/L	Total NH_3 as N mg/L	TKN mg/L	Total NO_2 + NO_3 as N mg/L	Total P mg/L	Turbidity NTU	Bacteria E. Coli Col/100ml
May	2	12	0.021	0.455	0.005	0.097		41
June	2	8	0.013	0.365	0.003	0.103**	2.3	
July	2	5	0.014	0.420	0.004	0.076	2.3	
August	3	10	0.022	0.467	0.014	0.082	3.9	55 max
September	1	3	0.028	0.400	0.015	0.062	3.7	**1300** max
October	2	29	0.016	0.475	0.003	0.076	2.9	
November	1	3	0.009	0.270	0.003	0.054	0.7	
Average		11	0.018	0.42	0.007	0.082	2.8	**248***

Note: water quality standards violations or guideline exceedances are in bold face. * Geometric mean for September. ** 30 day running average = 0.097 mg/L TP.

It appears from the data that sediment at this site is within the bounds of water quality determined to be supportive of the designated beneficial uses. Consequently, IDEQ will not complete a sediment TMDL on the creek and will delist this segment for sediment. However, IDEQ will proceed with a bacteria TMDL for Clover Creek as water quality violations are clear. IDEQ will not proceed with nutrient TMDLs for Clover Creek due to several factors. The Clover Creek upper site does exceed the monthly guideline for the calendar month of June. However, a 30-day running average does not exceed TP guidelines. Additionally, other factors such as DO violations and pH violations

do not occur. Furthermore, nuisance aquatic vegetation has not been documented in the creek at any location. Also, both the TP guideline exccedances on Clover Creek occur at less than 10 percent of the total samples.

2.4.7 Three Creek

Water quality samples located within the listed segment of Three Creek are rare. Although the STORET database was reviewed, no samples from the creek could be found. IDEQ has sampled in the creek over the course of 2000. Due to the limited number of sampling periods in the data set, IDEQ's confidence in monthly average concentrations was low. In most cases two samples were the most collected in any given month. More commonly a single sample was collected for any given month. This sampling design was intended to determine annual load. Additionally, the annual load estimated by this type of design would over estimate annual load by 25 to 50 percent (Robertson and Richards 2000). However, to assist in the determination of seasonal components and appropriate critical conditions the data will be presented as monthly averages in following tables while annual averages are presented in the text. (Table 19). One sample location was set up on Three Creek (see Figure 20) with sampling beginning in April of 2000. As the entire water body was listed as water quality limited, only the most downstream location was chosen. The sampling location would capture all of the impacts from the entire watershed.

At the sampling location, the effects of similar land uses can be seen in a comparison of the middle Clover Creek location as well as the upper Clover Creek location. In most cases, the data collected were very similar to the data from the two Clover Creek locations. For example, TSS in Three Creek averaged 10 mg/L (standard deviation 6 mg/L) which is slightly higher than the Clover Creek upper site. These samples were taken the same days as the Clover Creek samples and include the critical periods of springtime high flows and summertime low flows. TP data were as similar as suspended sediments. At Three Creek the average TP concentration was 0.097 mg/L (standard deviation 0.018 mg/L), while at the Clover Creek middle location, the average TP concentration was 0.080 mg/L. A t-test was completed and it was determined that the slight differences in the sample means from the two location were not statistically significant (p=0.246). The minimum measured TP concentration at Three Creek was 0.063 mg/L in early October and the maximum was 0.124 mg/L in late April, indicating a strong seasonal component to the TP loadings. Both TP and TSS concentrations fell dramatically as the year progressed. Bacteria concentrations were also very low in the spring during the peaks in the other constituents. The inference IDEQ draws from this data is that the phosphorus source is coming from sediment associated sources such as raw banks, fertilizer applications, and runoff from agriculture fields.

Due to IDEQ's limited sampling for suspended sediments in the Three Creek system additional measures were taken to determine if other forms of sediment were impairing the beneficial uses. From IDEQ's sampling regime, it was determined that the suspended fraction of the sediment load was not impairing the uses. Therefore, a series of Wolman pebble counts were conducted at the lower-most sampling location. These Wolman pebble counts were conducted to determine if bedload sediment was impairing beneficial uses. Following the BURP protocols, Wolman pebble counts were conducted on riffles in a three-km reach of Three Creek. Counts were conducted from bankfull edge to bankfull edge until at least fifty measurements were taken. Following this the crew would travel upstream approximately 100 m to another riffle. This was repeated until the crew had collected 30 series of Wolman pebble counts (approximately 3.25 km of the creek). A similar system (one that the beneficial uses have been documented as being fully supported) was chosen from the general area of the §303(d) listed water body for comparison with Three Creek. In this case Big Flat Creek was chosen. Big Flat was removed from the §303(d) list in 1998 because it was determined that the beneficial uses were fully supported. Wolman pebble counts were conducted on Big Flat Creek in a similar manner over a three-km reach of the lower portion of the creek.

To determine if the percent surface fines (IDEQ-TFRO's surrogate for bedload) between the two streams were significantly different, a paired t-test analysis was completed. The test indicated that the percent surface fines between the fully supported water body and Three Creek were significantly different (p = 0.0005). As a result of the differences between the percent fines of the two streams, IDEQ has determined that sediment as measured by the percent surface fines surrogate are impairing Three Creek, but that the suspended load is not.

Table 19. MEASURED CONSTITUENTS IN THREE CREEK

Month	Number of Samples	TSS mg/L	Total NH_3 as N mg/L	TKN mg/L	Total NO_2 + NO_3 as N mg/L	Total P mg/L	Turbidity NTU	Bacteria E. Coli Col/100ml
April	1	21	0.019	0.510	0.008	0.124	9.2	10
May	2	7	0.017	0.400	0.008	0.099	7.7	14
June	2	9	0.015	0.375	0.004	**0.113**	2.8	
July	2	7	0.015	0.380	0.003	0.094	3.6	
August	1	20	0.028	0.680	0.003	0.102	8.5	
September	0							
October	2	9	0.024	0.465	0.003	0.074	4.1	
November	1	10	0.012	0.310	0.005	0.085	4.4	
Average		10	0.018	0.43	0.005	0.097	5.1	12

Note: water quality standards violations or guideline exceedances are in bold face.

It appears from the data that suspended sediment and bacteria are within the bounds of water quality determined to be supportive of the designated beneficial uses. Consequently, IDEQ will not complete a suspended sediment TMDL on the creek. However, IDEQ will complete a TMDL for bedload sediment using the surrogate of percent surface fines. Due to the single exceedance of the TP monthly average guideline IDEQ propose to conduct additional monitoring to determine if a nutrient TMDL should be undertaken. However, as TSS and bed load are linked in this analysis and in other systems it has been shown that a strong link exists between TSS and TP implementation of the bedload TMDL should alleviate any need for a nutrient TMDL in the Three Creek water shed in the future. The additional monitoring proposed should answer this questions. If, through the additional monitoring it is determined that TP reductions are required then Three Creek will be added to the next §303(d) list and a TMDL will be initiated. Furthermore, DO and pH violations have not occurred in Three Creek that would indicate that nutrients are in excess and are causing nuisance aquatic vegetation.

2.4.8 Cougar Creek

No water quality samples were collected in Cougar Creek due to the fact that it was dry. Sampling was attempted in late April 2000 during high water runoff for most of the subbasin. At that time the creek was dry. Therefore, IDEQ has assessed the creek and determined that it is an ephemeral channel. Prior to this determination the water quality and beneficial use support status in the Jarbidge River was determined to be fully supported. This determination was made using BURP data. Due to the ephemeral nature of Cougar Creek IDEQ has relied upon the assessment of downstream waters to determine if the ephemeral channels are degrading the beneficial uses of the perennial streams within a system. The beneficial uses of Cougar Creek's downstream receiving water have been documented as fully supported. Therefore, IDEQ assumes that water quality impacts from Cougar Creek do not exist, and that the likely beneficial uses of Cougar Creek are also fully supported. As a result, IDEQ will not complete a TMDL of Cougar Creek and will remove it from the §303(d) list. At such time that water quality standards and beneficial use status in ephemeral waters are better understood, IDEQ will review the delisting of the creek.

2.4.9 Poison Creek

No water quality samples were collected in Poison Creek due to the fact that it was dry. Sampling was attempted in late April 2000 during high water runoff for most of the subbasin. At that time the creek was dry. Therefore, IDEQ has assessed the creek and determined that it is an ephemeral channel. Prior to this determination the water quality and beneficial use support status in the Jarbidge River was determined to be fully supported. This determination was made using BURP data. Due to the ephemeral nature of Poison Creek IDEQ has relied upon the assessment of downstream waters to determine if the ephemeral channels are degrading the beneficial uses of the perennial streams within a system. The beneficial uses of Poison Creek's downstream receiving water have been documented as fully supported. Therefore, IDEQ assumes that water quality impacts from Poison Creek do not exist, and that the likely beneficial uses of Poison Creek are also fully supported. As a result, IDEQ will not complete a TMDL of Poison Creek and will remove it from the §303(d) list. At such time that water quality standards and beneficial use status in ephemeral waters are better understood, IDEQ will review the delisting of the creek.

2.4.10 Summary of Existing Water Quality Data

Sediment is listed as a pollutant of concern in the Bruneau River Subbasin, but for most of the reaches, the suspended sediment concentrations are relatively low. The exceptions to this are the elevated suspended concentrations in the spring in Jacks Creek, and the elevated percent fines in Three Creek. Percent surface fines will be used as a surrogate for the bedload component of sediment. The effects of nutrients (TP) can be seen along Jacks Creek with locally dense mats of macrophytes along the river channel. High concentrations of TP are impairing the beneficial uses in Jacks Creek. Slightly elevated TP concentrations can be found in the Bruneau River. The elevation may lead to beneficial use impairment in the downstream reservoir. In the remaining systems TP elevations are of small magnitude and are infrequent throughout the year. As a result, nuisance aquatic vegetation growths has not occurred and therefore no water quality violations have occurred.

The water quality within many of the reaches is sufficient to provide for fisheries and support other beneficial uses. TSS, and in most cases TP, concentrations are below levels associated with degraded water quality. Bacteria counts; however, are impairing the beneficial uses of two streams in the subbasin. The counts are very high in Jacks Creek and over the standards in Clover Creek. In both of these streams, recreational beneficial uses are not supported.

Based on the water quality data collected by IDEQ, the TMDLs listed in Table 20 will be completed within the subbasin. Based on the data collected and presented in this SBA the streams and pollutant combinations listed in Table 21 will be delisted. Furthermore, as presented in this SBA, and due in part to the policy of IDEQ and USEPA, several pollution/water body TMDLs will not be completed. Those pollution/water body combinations; however, will remain on the §303(d) list. Additionally, it is IDEQ's belief that the state's current water quality standards were derived from an outdated understanding of the cold water biota's temperature requirements. Consequently, IDEQ is participating in a regional review of temperature criteria, which is being organized by USEPA Region 10. Following the conclusion of the temperature review, temperature exceedances in the Bruneau River Subbasin will be reassessed and, if needed, a temperature TMDL will be completed. Those water bodies listed for temperature will have TMDLs delayed until further notice (Table 22).

Table 20. TMDLS TO BE COMPLETED IN THE BRUNEAU RIVER SUBBASIN

Segment	TMDL-pollutant	TMDL-pollutant	TMDL-pollutant	TMDL-pollutant
Bruneau River	Nutrients - TP			
Jacks Creek	Nutrients -TP	Dissolved Oxygen -TP	Bacteria	Sediment- TSS
Three Creek	Sediment - percent fines			
Clover Creek	Bacteria			
Sugar Valley Wash	Nutrients -TP	Dissolved Oxygen -TP	Bacteria	Sediment- TSS

Table 21. DELISTINGS TO BE COMPLETED AS A RESULT OF THE BRUNEAU SUBBASIN ASSESSMENT

Segment	TMDL-pollutant	TMDL-pollutant
Bruneau River	Sediment	
Hot Creek	Sediment	Bacteria
Clover Creek	Sediment	
Cougar Creek	Sediment	
Poison Creek	Sediment	
Sugar Creek	Sediment	
Wickahoney Creek	Sediment	

Table 22. TMDLS DELAYED UNTIL APPROPRIATE POLICY IS DEVELOPED

Segment	TMDL-pollutant	TMDL-pollutant
Bruneau River	Flow Alteration	Temperature
Jacks Creek	Flow Alteration	Temperature
Wickahoney Creek	Flow Alteration	
Hot Creek	Flow Alteration	

2.5 Identification of Data Gaps

Within the Bruneau River SBA-TMDL data gaps exist. As with most SBAs and TMDLs undertaken due to the court imposed time line, data gathering, analysis, and monitoring time was very limited. When other agencies undertake large tasks they encounter similar data gaps; often times these gaps exist due to funding sources (or lack of funding sources). The Bruneau River SBA-TMDL is no exception. When various agencies are faced with funding constraints and time obstacles, they rely on statistical inferences and surrogates to evaluate management objectives. In addition, when sufficient site-specific data does not exist they use their "best professional judgement and experience" to answer critical questions. Data gaps that need to be addressed to better describe the system include the following.

1. Additional diel pattern studies of dissolved oxygen, temperature, and pH are needed to evaluate the effects of nighttime oxygen sags due to aquatic plants in the Bruneau River and Jacks Creek.

2. Continuous temperature recordings and hot spring discharge measurements are needed to better document and evaluate cold water biota as a beneficial use in some streams.

3. Fisheries investigations are needed to determine if salmonid fishes spawn or use the riverine environments of the Bruneau River below Hot Creek.

4. Reference locations need to be determined and monitored to better develop concentration limits and targets.

5. TSS, TP, and *E. coli* monitoring on a bi-weekly basis for a full year is needed to establish a competent baseline.

6. Chlorophyll a studies in all segments to determine nuisance aquatic vegetation levels.

7. Aquatic macrophyte surveys in all segments to determine levels of nuisance aquatic vegetation

2.6 Pollution Source Inventory

There are four categories of potential pollution inputs to the waters of the Bruneau subbasin: background, point sources within the subbasin, natural non-point sources, and human-induced non-point sources.

There are two permitted point sources in the basin; both of these discharge to Jacks Creek. It is unknown at this time how many sources land-apply their waste. Although the total discharges are minimal, the high concentrations of pollutants can make the loadings significant, particularly at lower flows. Confined animal feeding operations (CAFOs) (for dairy and meat production), septic systems, and activities such as farming and grazing have the potential to produce pollutants in the watershed. Total surface discharges from these activities are minimal (with the exception of the growing season return flows from irrigated agriculture) and have relatively minor impacts on the reaches. As noted, the region is arid, and most surface flow is intercepted and consumed in the agricultural process, evapotranspired, or infiltrated to the subsurface.

The contributions of the nonpoint source impacts; however, are often integrated from the many entry sites into the larger discrete flows of the tributaries and drains. This integration often hides the magnitude of the impacts of single activities or sources. For example, home sewer systems and animal feedlots are legally forbidden to produce direct surface discharge. Manure from the latter activity is eventually spread on agricultural lands as fertilizer, and becomes inseparable from other nutrient production that results from application of chemical fertilizer in the agricultural process. The great majority of lands used exclusively for grazing in this arid area produce no surface runoff at all, although rangelands comprise approximately 91 percent of the subbasin's land use. Where grazing (post-harvest) occurs in combination with agriculture, the effects of manure and trampling of riparian areas may be inseparable from, and concurrent with, the effects of fertilizer application and plowing up to the stream sides.

Natural erosive processes by the streams in the subbasin would include scouring stream banks and beds, overland sediment transport, and mass wasting (earth movement down-gradient). The natural introduction of nutrients and sediment into the watershed would include those from precipitation and wind transportation. Most of these processes are also, to some respect, enhanced or accelerated by human alterations of the landscape (e.g., grazing and farming operations that effect riparian growth and streamside cover), often making specific attribution of pollutant production difficult.

2.6.1 Identification of Point and Nonpoint Sources

The following sections will discuss the point sources and major nonpoint sources within each segment of the Bruneau River Subbasin. These sources or land uses will serve as the basis for the load allocations in the required TMDLs. It should be noted that riparian land uses have been given loads in the following sections of this report. Principally this was due to the 1992 §305 (b) report and the common occurrence (as cited by the report) that riparian habitats have been removed or degraded on many of the systems on the §303(d) list. This removal of the riparian component may not be reflected in the current GIS coverage of land uses within the subbasin. Therefore, these areas of the subbasin may be contributing a percentage of the current load, hence in current loading discussions riparian land uses received a percentage of the overall load similar to the percentage represented on the GIS coverage as the

other land uses did. Furthermore, the riparian land use will receive a load allocation, which will require reductions to occur from the current load. These reductions will occur as riparian habitats are restored through implementation of the TMDL. Additionally, the fraction of the load allocated to the riparian land use, if the riparian land use is not actually contributing load, will serve as an additional margin of safety for the overall TMDL .

2.6.1.1 Bruneau River

This segment of the Bruneau River reach falls wholly within the fifth field HUC of 1705010201. The land uses from GIS coverages indicate that 0.3 percent of the watershed is dryland farms, 30.7 percent is irrigated croplands, and 64.5 percent is rangelands. These are the major sources of nonpoint source pollution in the watershed. Of the irrigated lands, the majority is sprinkler irrigated (16.5 percent of the watershed). Additional sediment sources include unstable banks and reentrainment from the riverbed itself. However, quantification of these sources has not been completed. As of yet, no CAFOs are known to exist within the watershed.

2.6.1.2 Jacks Creek

Two warm water fish hatcheries (approximately 8 km downstream from Big and Little Jacks confluence) discharge to the Jacks Creek segment. These facilities fall under general aquaculture NPDES permits. This listed creek segment also falls completely within watershed HUC 1705010233. No other known point sources are located within this segment of the creek. The Jacks Creek segment flows through a portion of the fifth field HUC of which Big Jacks Creek dominates. Big Jacks Creek has not been §303(d) listed.

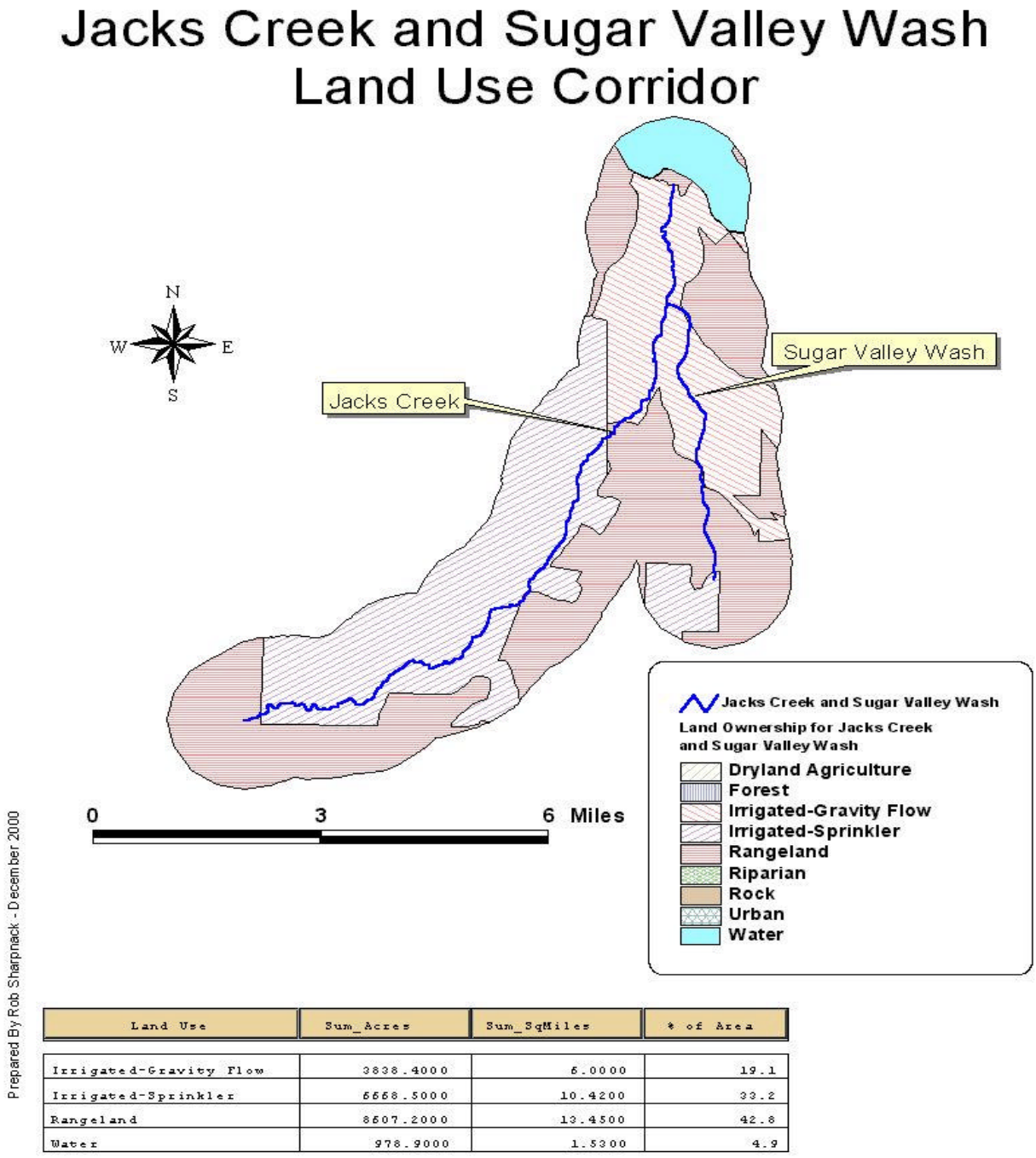
A river corridor approach was taken to determine the percentages of land uses and nonpoint sources within the listed segment and to determine future load allocations. The corridor approach was used due to the nature of the hydrology in the Big and Little Jacks Creek watershed of which Jacks Creek is a part. Had the load allocations been based on the land use of the entire watershed most of the load would have been allocated to rangeland which is inconsistent with the land uses surrounding Jacks Creek. By using the corridor approach, allocations could be based on the land uses surrounding and effecting Jacks Creek. Additionally, most contributions of nonpoint source pollution may be limited to the area adjacent to Jacks Creek due to the nature of the land use practices in the area. According to NRCS, ISCC, USDA and IDEQ approximately 90-95 percent of the impacts to any given stream will occur within the stream corridor.

The corridor consisted of a three-km wide (1.5 km on either side) transect along Jacks Creek and Sugar Valley Wash (Figure 22 and Figure 23). It includes the areas adjacent to Jacks Creek, Sugar Valley Wash, and some overlap with the upper segments of Big and Little Jacks Creek as well as CJ Strike Reservoir.

According to the river corridor model, the land uses include 17.9 percent gravity-irrigated crop lands, 37.7 percent sprinkler-irrigated crop lands, 38.4 percent rangeland, and 6 percent water. Land ownership within the corridor is 35.2 percent USBLM, 59.4 percent private deeded property, and 5.4 percent state owned open water. The irrigated croplands receive water predominantly from groundwater pumping. Other sources of pollutants (sediment) include bank destabilization and reentrainment of sediment from the riverbed.

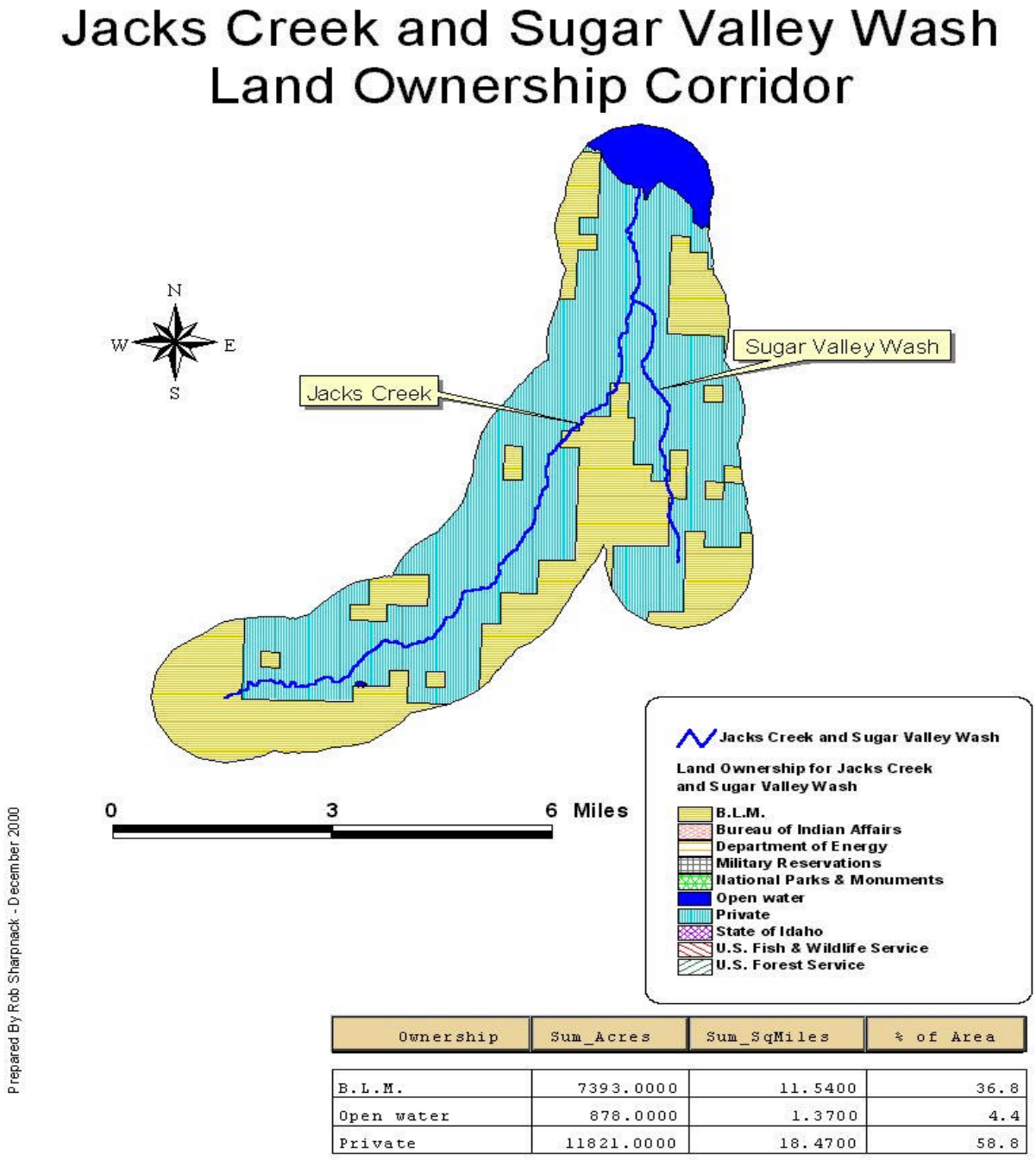
2.6.1.3 Sugar Creek

This segment transects the fifth field HUC 1705010231. The land uses from GIS coverages of the watershed indicate that 94.7 percent of the watershed is rangeland, 3.4 percent are gravity-irrigated croplands, and 1.9 percent is sprinkler-irrigated cropland. No TMDLs will be completed for Sugar Creek. Sugar Valley Wash will be incorporated into the Jacks Creek allocations that were based upon the river corridor approach as seen in figures 22 and 23.



Land Use	Sum_Acres	Sum_SqMiles	% of Area
Irrigated-Gravity Flow	3838.4000	6.0000	19.1
Irrigated-Sprinkler	6668.5000	10.4200	33.2
Rangeland	8607.2000	13.4500	42.8
Water	978.9000	1.5300	4.9

Figure 22. Land Use Corridor for the Jacks Creek Segment, showing the watersheds (5th field HUCs) and land use practices in the two-mile wide corridor.



Ownership	Sum_Acres	Sum_SqMiles	% of Area
B.L.M.	7393.0000	11.5400	36.8
Open water	878.0000	1.3700	4.4
Private	11821.0000	18.4700	58.8

Figure 23. Land Ownership Corridor for the Jacks Creek Segment, showing the watersheds and major landowners in the two-mile wide corridor.

2.6.1.4 Wickahoney Creek

This segment transects the fifth field HUC 1705010234. The land uses from GIS coverages of the watershed indicate that 94.6 percent of the watershed is rangeland, and the remainder, 5.6 percent is riparian areas. There are no point sources located within the watershed.

2.6.1.5 Hot Creek

This segment transects the fifth field HUC 1705010230. The land uses from GIS coverages of the watershed indicate that 99.8 percent of the watershed is rangeland, and the remainder, 0.2 percent is riparian areas. There are no point sources located within the watershed.

2.6.1.6 Clover Creek

This segment transects two fifth field HUCs: 1705010203 and 1705010205. The land uses from GIS coverages of the watershed –03 indicate that 80.9 percent of the watershed is rangeland and the remainder, 19.1 percent is riparian areas. The land uses from GIS coverage of the watershed –05 indicate that 91.4 percent of the watershed is rangeland and the remainder, 8.6 percent is riparian areas. There are no point sources located within the watershed.

2.6.1.7 Three Creek

This segment transects the fifth field HUC 1705010206. The land uses from GIS coverages of the watershed indicate that 83.1 percent of the watershed is rangeland, 0.8 percent is gravity-irrigated croplands, 2.3 percent is sprinkler-irrigated croplands, and 13.7 percent of the watershed is riparian areas. There are no point sources located within the watershed.

2.6.1.8 Cougar Creek

This segment transects the fifth field HUC 1705010215. The land uses from GIS coverages of the watershed indicate that 94.1 percent of the watershed is rangeland and the remainder, 5.9 percent, is riparian areas. Most of this segment is an ephemeral channel that only carries water during rain and snowmelt events. There are no point sources located within the watershed.

2.6.1.9 Poison Creek

This segment transects the fifth field HUC 1705010211. The land uses from GIS coverages of the watershed indicate that 98.5 percent of the watershed is rangeland areas and the remainder, 1.5 percent, is riparian areas. Most of this segment is an ephemeral channel that only carries water during rain and snowmelt events. There are no point sources located within the watershed.

2.7 Characterization of Specific Pollutant Per Industry

2.7.1 Municipalities

The city of Bruneau has a land application permit (LA-000129) for the waste generated in the town. The permit allows for zero discharge into receiving waters. There are no other towns within the subbasin that are large enough to land-apply or discharge wastes.

2.7.2 Aquaculture

Under the conditions of the general NPDES permit, aquaculture facilities have permit limits on discharges of total suspended solids, pH, total phosphorus, nutrients, temperature, dissolved oxygen, settable solids, disinfectants, feed supplements, and disease control chemicals. There are two permitted facilities in the subbasin, both of which are warm water facilities. The two facilities are located on Jacks Creek and are Ace Development USA, Inc. (new permit # IDG130123, old permit # ID0027871), and Arraina Inc. (new permit # IDG130122, old permit # ID0027863).

2.7.3 Nonpoint Sources

Nonpoint source pollutants are more difficult to control because they do not come from clearly identifiable sources. The primary pollutants from nonpoint sources are sediment, nutrients, fecal coliform bacteria, organic enrichment, ammonia, oil and grease, pesticides, thermal modification, salt, and flow alteration (see Table 23).

Table 23. MAJOR SOURCES OF NONPOINT SOURCE POLLUTION

Nonpoint sources	SEDIMENT	NUTRIENTS	BACTERIA	BOD_5	AMMONIA	OIL & GRES	PESTICIDES	SALT	THERMAL	FLOW
Agricultural Diversions									X	X
Agriculture	X	X	X	X	X	X	X	X	X	X
Confined Animal Feeding Operations	X	X	X	X	X	X	X			
Grazing	X	X	X	X	X		X		X	X
Forest Practices	X	X	X	X	X		X		X	X
Recreation	X	X	X	X	X	X				
Urban Areas	X	X	X	X	X	X	X		X	X
Construction (roads, highways, bridges)	X	X				X			X	X

Table 24 displays the numbers of commercial domestic livestock animals held in confined animal feeding operations in Owyhee County.

Table 24. CONFINED FEEDING TYPES IN THE BRUNEAU RIVER SUBBASIN

Animal Type (1997, 1998 Census USDA Numbers)	Owyhee County (Total Number of Animals)
Cattle and Calves	108,071
Sheep and Lambs	6,834
Swine	226

Small-scale irrigation diversions on creeks and rivers are regulated through the IDWR. Diversions also contribute to the degraded water quality of the tributaries. Although peak flows are not changed as with large dams, dramatic changes in the annual hydrograph still occur. In some instances, flow in the summer is reduced to almost nothing to meet irrigation demands. Flow can be augmented in the fall, in some reaches, as irrigation return flow is rerouted from the canals and ditches to stream channels other than the ones from which the water was diverted.

2.8 Groundwater Concerns

Groundwater in the Bruneau River reach may be impacted by a variety of sources. Much of the drinking water and irrigation water for some areas comes from the western Snake River Plain Aquifer. Sources of contamination to this aquifer include uncased or poorly cased production wells and leaking underground storage tanks. The cracked basalt nature of the lithology of the aquifer can result in impacts to the groundwater by nonpoint sources such as wells. Poorly lined waste lagoons and over application of fertilizer in irrigation water can lead to pollutants infiltrating into the aquifer from many locations.

The Western Snake River Plain is underlain predominantly by a series of vesicular and broken basalt flows that contain regional water flows in the aquifer that move from lower layers to upper aquifer layers and from the southeast to northwest (Newton 1991). In the area of concern, groundwater is discharged from the Western Snake River Plain aquifer as spring flow and seepage to the Snake River between King Hill and Murphy. Discharge to the entire reach was about 11.04 cms in 1980 (Newton 1991). In addition to this water gained in the Snake River, many geothermal springs influence the water quality of the Bruneau subbasin to an unknown extent.

NO_X in groundwater is a result of nitrogen input from many different sources. The proportions of nitrogen supplied by the various sources depend on land use practices. USGS estimated the amount of nitrogen supplied by cattle manure, domestic septic systems, inorganic fertilizer, legume crops (alfalfa and beans), and precipitation for each county in the Upper Snake River Basin (USGS 1996).

Excessive aquatic plant growth in surface waters is a major concern in the western United States. Groundwater adds nitrogen and phosphorus to surface water where groundwater discharges to the Bruneau River reach. Only 21 percent of data collected in the regional wells contained NO_x concentrations higher than 0.3 mg/L, which is the critical limit for stimulation of aquatic plant growth in surface water in the presence of adequate phosphorus. This suggests that nitrogen is not necessarily a limiting factor for aquatic plant growth in most streams that receive groundwater.

Other groundwater concerns in the subbasin are relatively minor. There are only five reported underground storage tanks within the basin, none of which is currently identified as leaking.

2.9 Summary of Past/Present Pollution Control Efforts

The following pollution control efforts/projects are described as point and nonpoint source efforts.

2.9.1 Nonpoint Source Pollution Control Efforts

In 1979, as a part of a study conducted by IDEQ on the Snake River from the Idaho-Wyoming border to Weiser, it was stated that a "general increase in nutrient concentrations from upstream to downstream stations exceeded the recommended criteria over most of the river a majority of the time (IDHW 1979)." It was also stated that "in most Snake River segments and major tributaries, point sources are not major contributors of nutrients." In fact, "the major reduction in nutrient loadings will come from nonpoint source controls (IDHW 1979)." It was recommended at that time that the nutrient control plan for the Snake River should be implemented in two phases: Phase I would concentrate on control of phosphorus sources, and Phase II would focus on nitrogen sources. The nonpoint sources on both sides of the Snake River should be reduced by implementation of the Agriculture Pollution Abatement Plan (IDHW 1979). Since that time, the Idaho Agriculture Pollution Abatement Plan has been referenced in Idaho Code §39-3601 et seq. as the source of BMPs for agricultural sources. IDEQ anticipates that the agriculture community, as part of the nonpoint source portion of the TMDL, will adopt and implement those BMPs (where applicable) as defined in the Agriculture Pollution Abatement Plan. A feedback loop will be used to identify non-functioning BMPs and these will be modified so functional BMPs will be applied for the reduction of sediment and nutrients, as well as other parameters linked to the sediment.

2.9.1.1 Water Quality Projects

The Idaho State Agricultural Water Quality Plan (SAWQP) has undergone major revisions in its funding since it was developed as a partnership between the participant, local SCD (which, is the technical agency) and IDEQ. There have been no SAWQP projects completed in the Bruneau River. The SCC is currently developing a new program to replace SAWQP.

2.9.1.2 Idaho Department of Lands

On April 17, 1998, a memorandum was jointly signed by IDEQ and IDL, which attempted to clarify roles and ensure coordination of efforts in the development of TMDLs for state owned portions of lands within the subbasins with approved TMDLs. As previously described, none of the land use in the Idaho portion of the Bruneau River Subbasin is forested, making the overall effects from forested ground minimal (see section 2.1.1.1). However, the state does own 5.5 percent of the Idaho portion of the subbasin. On these lands grazing and rangeland practices are used.

2.9.1.3 Irrigation community pollution control efforts

The local SCD has been active in the subbasin since 1953. During the early years, the district developed annual work plans focusing on drainage investigations and on developing and irrigating new lands. The SCD also improved the local water distribution system by eliminating canal seepage problems and conducting drainage studies. The SCD also worked with the IDFG in habitat improvement projects around the subbasin. The overriding goal of the early SCD was to develop for each cooperator a basic soil and water conservation plan. After 1984, the SCD underwent a major revision in its goals for the area (McBride 2000). The SCD has placed a high priority on water, rangeland, and animal waste management. In addition, wildlife habitat protection is a high priority of the SCD.

2.9.1.4 §319 Projects

Each Year the USEPA awards grants to conduct nonpoint source pollution reductions. These monies are collectively known as §319 grants. Local citizen groups, state agencies and others may submit project proposals to IDEQ and the respective BAGs for evaluation. The current scoring system employed by these two groups gives more weight to those project proposals within areas with approved USEPA TMDLs. There have been no §319 Projects in the subbasin to date. Following the approval of the SBA-TMDL IDEQ will work with the local Bruneau group to develop project proposals for the implementation of the TMDL.

2.9.1.5 Federal Water Quality Projects

The USFWS entered a short-term conservation agreement with the local landowner in the vicinity of Indian Bathtub on Hot Creek. Through the agreement, the USFWS paid for fencing to control livestock access into the spring area. As of 1998, the agreement had expired but the landowner has honored the terms of the agreement and has voluntarily excluded grazing in the Indian Bathtub area of Hot Creek.

The USBLM has constructed grazing exclosures along Wickahoney Creek. A total of 2.6 km of the stream has been excluded from grazing. Additionally, the USBLM has changed the season of uses in the Wickahoney allotment from season-long to spring use only. This change took place in 1997. Currently the USBLM is working on a fish passage structure at the Wickahoney Crossing area. In this area an old culvert prevents fish migration upstream from Big Jacks Creek. The drop from the old culvert to the streambed is approximately 1m.

2.9.2. Point Source Pollution Control Efforts

The following are the activities that have been undertaken by the point source industries in the subbasin.

2.9.2.1 Aquaculture General Permit

Aquaculture facilities had their public comment period from April 10, 1998, to June 9, 1998, on a proposed general NPDES permit (No. ID-G13-0000). The general NPDES permit contains technology-based limitations for sediment based upon the same effluent guidelines as previous NPDES permits for Idaho's aquaculture industry. The aquaculture facilities authorized to discharge under this general permit raise fish; namely, rainbow trout, steelhead trout, chinook salmon, catfish, tilapia, and other fish. These fish are produced for market as food products or for the enhancement of salmonid populations. They discharge rearing wastewater containing fish excreta, excess fish feed, dissolved and suspended solid biological pollutants, oxygen demanding materials, nutrients, and residual disease control chemicals or therapeutics. The aquaculture facilities are required to develop BMPs plans supported by mass balance assessments of their operations and to restrict their discharges below specific technology-based limitations on total suspended solids and specific water quality-based limitations on total phosphorus, dissolved oxygen, and pH.

The previous permit required monitoring of TSS, settable solids, and flow. There were no BMPs requirements for water quality-based limitations. There were no limitations on discharge of TP, and the TSS limit was 5.0 mg/L for raceway discharges. The new permit requires that warm water facilities limit phosphorus discharges to 0.2 mg/L TP on a monthly average.

2.10 Monitoring in the Bruneau River Reach

Monitoring of the Bruneau River and other tributaries in the Bruneau River Subbasin will continue to occur with the resources from various agencies, organizations, and groups. Monitoring by IDEQ-TFRO on additional sites on the various tributaries and on the Bruneau River will be incorporated as funds become more available.

2.10.1 Soil Conservation District Monitoring

The Natural Resource Conservation Service (NRCS) has begun preliminary informational gathering to set up a monitoring program within the subbasin. The monitoring program will assist the Soil Conservation Commission in compiling the Bruneau subbasin implementation plan.

2.10.2 BURP Monitoring

BURP monitoring will continue within the subbasin to verify if beneficial use support status has been changed or achieved as necessary. For wadeable streams, large rivers, lakes, and reservoirs, the following parameters in Table 25 may be used to decide assessment of their beneficial uses. These reflect the minimum number of parameters needed to adequately surmise the level of beneficial use support status (either as full support or not full support). It is highly unlikely that any one parameter will have sufficient sensitivity to be useful in all circumstances.

Table 25. BURP MONITORING PARAMETERS

PARAMETER	WADABLE STREAMS	LARGE RIVERS	LAKES and RESERVOIRS
PHYSICAL/CHEMICAL PARAMETERS			
Bathymetry or Depth			X
Canopy Closure (Shade)	X		
Channel Alterations		X	
Conductivity		X	X
Discharge	X	X	
Dissolved Oxygen		X	X
Floodplain Disturbance		X	
Habitat Distribution	X	X	
pH		X	X
Large Organic Debris	X		
Nutrients			X
Photo Documentation and Diagrammatic Mapping	X	X	X
Pool Quality	X		
Riparian Vegetation		X	
Stream-Channel Classification	X		
Streambank Condition and Material Types	X	X	
Substrate and Embeddedness	X	X	X
Temperature	X	X	X
Water Clarity		X	X

PARAMETER	WADABLE STREAMS	LARGE RIVERS	LAKES and RESERVOIRS
Width and Depth	X	X	
BIOLOGICAL PARAMETERS			
Aquatic Macrophytes		X	X
E. Coli		X	X
Fish	X	X	X
Macroinvertebrates	X	X	X
Periphyton		X	X
Phytoplankton/Chlorophyll a		X	

2.11 No-Net Increase Policy on TMDLs

On May 7, 1998, a No-Net Increase Policy (NNIP) was made effective by IDEQ. When a stream is designated as not fully meeting its designated or existing beneficial uses, an interim time exits until the stream has a TMDL developed or the stream is delisted because its beneficial uses have returned to full support. During that interim, the NNIP (IDEQ Policy Memorandum, PM98-2, May 7, 1998), the provisions of IDAPA §58.01.02.054.04 (High Priority Provision) and IDAPA §58.02.02.054.05 (Medium and Low Priority Provisions) are to be utilized. The NNIP may not be interpreted as requiring BMPs for nonpoint source operations unless they are voluntary or unless they are outlined in applicable federal or state statutes. For agriculture, the source for BMPs for the control of nonpoint sources of pollution is referenced in the *Idaho Agriculture Pollution Abatement Plan* (IDAPA §58.01.02.054.07). These BMPs are those recognized as actions a farmer or land management agency may voluntarily implement. Although the policy does not generally pertain to accidental spills or unauthorized releases that may occur on listed waters, IDEQ then has the authority to ensure that human health and the appropriate beneficial uses are protected in the case of accidental spills or unauthorized releases, and could, depending on the spill or release, require clean up. Provisions of the NNIP include nonpoint source, point source, and general provisions.

2.11.1 Nonpoint Source Provision of NNIP

It is the responsibility of the designated agency to ensure that cost effective BMPs or knowledgeable and reasonable control measures, including pollution trading, have been or are properly implemented for all nonpoint source activities on federal, state, and private lands.

1. Where approved BMPs do not exist, the landowner should be assisted by the designated agency in using knowledgeable and reasonable control measures to ensure no further impairments of beneficial uses on low and medium priority waters, and that the load remains constant or decreases on high priority waters.

2. IDEQ recommends monitoring as a component of application of BMPs or other control measures.

3. If monitoring indicates that approved BMPs or other control measures are not maintaining or protecting beneficial uses then additional restrictions or modified control measures may be imposed.

2.11.2 Point Source (NPDES) Provision of NNIP

The Clean Water Act requires all point source dischargers to have an NPDES permit. In the event that USEPA cannot or does not issue a permit on a §303(d) listed water body, IDEQ will notify the discharger of the applicable

provisions specified in the High Priority Provision (IDAPA §58.01.02.054.04), the Medium and Low Priority Provision (IDAPA §58.01.02.054.05), and the Violation of Water Quality Standards (IDAPA §58.01.02.080).

1. A facility will be allowed to discharge to its existing maximum NPDES permit limit without being considered in violation of the High Priority or the Medium and Low Priority Provisions. Dischargers of listed pollutants to §303(d) waters; however , should be aware that interim increases in existing loads may result in the need for greater load reduction once a TMDL is developed and implemented.

2. A facility operating within its permitted discharge limits will not have to change its discharge limit while the TMDL is being developed. The NPDES permit and associated discharge limit will be examined and modified, if necessary, by USEPA at the time of permit reissuance.

3. When reviewing and approving plans under Idaho Code §39-118, including facility plans and specifications, written or verbal communication to the facility should emphasize that additional load reductions from the facility may be likely or required once the TMDL has been developed.

4. When meeting the provisions of the NNI policy, an NPDES permittee should address new or increased discharge of listed pollutants in terms of mass per unit time, toxicity, or other appropriate measures. IDAPA §58.01.02.054.04; however , specifies that for high priority waters, the total load must remain constant or decrease within the watershed.

5. To write a TMDL, IDEQ will establish loads based upon available information. Where information is lacking; however , facilities will be allowed to establish baseline data for the listed pollutants using standard analytical methods. IDEQ regions shall issue a letter to each facility detailing that if baseline information is not established by the discharger by a certain date, IDEQ will proceed to establish baseline information necessary for the development of a TMDL.

6. In situations where dischargers apply to exceed their maximum permit limits, provisions of IDAPA §58.01.02.054 shall apply. For high priority waters, new or increased discharge of pollutants of concern above permitted limits may be allowed if the total load to the watershed remains constant or decreases. For medium and low priority waters, IDEQ may require changes in loads and/or concentrations of pollutants of concern that prevent further impairment of beneficial uses. In either case, it is incumbent on the facility to provide loading calculations based on sound and accepted engineering practices that demonstrate the applicable provisions of IDAPA §58.01.02.054. Dischargers of listed pollutants to §303(d) waters; however , should be aware that interim increases in existing loads may result in the need for greater load reduction once a TMDL is developed and implemented.

7. Unpermitted facilities wishing to expand their facility operations will be required to acquire an NPDES permit from USEPA and meet all applicable provisions of IDAPA §58.01.02.054.04 or IDAPA §58.01.02.054.05.

2.11.3 General Provision of NNIP

The following general provisions apply on the NNIP.

1. If IDEQ determines, based on reliable and verifiable water quality information, that a specific listed pollutant is not impairing the §303(d) water body, then delisting will be recommended and a TMDL will not be developed for that pollutant and water body.

2. Any facility or operation implementing control measures after the WAG (if applicable) or BAG (in the absence of a WAG) review of the subbasin assessment, and before USEPA's approval of the TMDL, that results in a verifiable reduction of listed pollutant(s) to a §303(d) water quality limited water body, will be credited with the appropriate load reduction during the allocation phase of the TMDL. This does not guarantee; however , that additional load reductions by the facility will not be required in order to meet water quality goals necessary to obtain beneficial uses.

3. All activities related to stream channel alteration permit applications must comply with IDWR's Rules and Minimum Standards for Stream Channels Alteration. IDEQ shall give IDWR written notice if a §303(d) stream will be impacted, and caution that additional measures may need to be taken to later address water quality once the immediate threat has passed. In any situation, stream alteration activities shall not violate Idaho Water Quality Standards except as outlined in IDAPA §587.01.02.080.02 (Short Term Activity Exemptions).

In order to ensure that water quality is protected, the following conditions may be included by IDEQ in the final stream channel alteration permit.

1. Construction shall be conducted in such a manner to minimize turbidity and comply with the Idaho Water Quality Standards and Wastewater Treatment Requirements.

2. Work shall be conducted during low flows and heavy equipment shall operate from the bank.

3. All fuel, oil, and other hazardous materials shall be stored and equipment refueled and serviced away from the stream to ensure that a spill cannot enter the waterway.

4. All areas subject to erosion because of the construction shall be protected with rock riprap or other suitable methods of erosion protection meeting IDWR minimum standards.

5. Disturbed areas shall be revegetated and/or seeded with perennial vegetation.

6. All temporary structures, excavated material, or construction debris resulting from the construction shall be disposed of out of the stream channel so it cannot reenter at high flows.

7. Materials excavated from the construction site shall be discharged in an upland area so it cannot reenter the stream channel at high flows.

8. Sandbags or other methods of coffer damming shall be utilized to minimize working in the flowing water.

Provided that these inclusions and IDWR minimum construction standards are included in the final permit, water quality impacts should be minimal.

Additionally, for suction dredging operations in Idaho, USEPA provides the following guidelines (USEPA 1998c) if an NPDES permit strategy was developed:

1. For new large-scale commercial operations, individual NPDES permits will be required prior to beginning operations.

2. For moderately-sized operations (with intakes greater than 5 inches and over 15 horsepower), consideration will be given to issuing a general NPDES permit. The state of Idaho would have the flexibility, through their 401 certification program, to determine which stream segments would be off-limits to dredging due to water quality concerns (such as segments on the §303(d) list).

3. For small-scale, recreational dredging operations which are adequately regulated under state programs (such as the One Stop Permit) or other federal programs (by the Corps of Engineers CWA 404 program), the USEPA could consider either a general permit or, with respect to unpermitted discharges, enforcement discretion if the discharges did not result in violations of state water quality standards.

4. All National Environmental Policy Act related activities are subject to compliance with all applicable rules and regulations. During the formal National Environmental Policy Act public comment period, IDEQ shall notify the designated agency when activities may impact a listed water. It is incumbent on the designated agency to demonstrate that the activity under consideration will result in no further impairments of the beneficial uses on low and medium priority waters, and that the total load of listed pollutants remains constant or decreases on high priority waters.

5. IDEQ has the authority to review storm water pollution prevention plans for adequacy and compliance with the provisions of IDAPA §58.01.02.054. Should these plans be deemed inadequate, IDEQ will notify USEPA who is responsible for enforcement and/or corrective actions.

2.12 Pollution Prevention

The U.S. Pollution Prevention Act of 1990 defines source reduction as any practice that reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment prior to recycling, treatment or disposal. Pollution prevention includes the reduction of pollution at the source (source reduction), and increased efficiency in the use of raw materials and natural resources. The emphasis of pollution prevention is on end-of-pipe control (for point sources) as a continuing mechanism for regulatory agencies to realize environmental goals. The program has been de-emphasized by giving further attention to reducing the sources of environmental pollution through changes in processes, operations, and the use of other materials. The program has placed the focus for identifying opportunities for such changes on the owners and managers of commercial, transportation, agricultural, and industrial operations. The groups and individuals are the ones who best know and understand the systems. Additionally, by encouraging an emphasis not just on achieving regulatory compliance, but on achieving the best possible environmental results will often substantially surpass compliance requirements and generally yield better economic benefits. IDEQ and USEPA promote and support this change of emphasis and are working with other stakeholder state and federal agencies to develop a range of incentives and recognition programs for companies, farmers, and other entities to improve their environmental performance. IDEQ and USEPA are doing this by focusing generally on environmental improvements or targeting on particular environmental problems (IDEQ 1998a). At the present time, IDEQ is in the process of building a framework for an Idaho Pollution Prevention Incentive program. When this program is in place, IDEQ will promote and support it by encouraging superior environmental management and beyond-compliance environmental performance with appropriate stakeholders.

2.13 Public Participation

An integral part of the SBA-TMDL development process is public participation. The public has been invited to participate throughout the process in different forums. These include the interested citizens of the towns of Bruneau and Three Creek, the Southwest BAG, and planned public release of draft documents for review and comments. Public comments will be located in Appendix B. following their receipt.

2.13.1 Southwest Basin Advisory Group

The BAGs, are stewards of water quality in specific basins. The state of Idaho Legislative body in §39-3601 et seq. codified this stewardship role. The BAG provides direction, advice and guidance to IDEQ and local WAGs within the different basins. Review and comments on the Bruneau River TMDL were a part of the Southwest BAG's water quality stewardship program. The results of the Bruneau River TMDL were presented to the Southwest BAG on November 2, 2000.

2.13.2 The Citizens of Bruneau and Three Creek

The local citizen groups have been a major vehicle for public participation concerning the Bruneau River TMDL. The group in the town of Bruneau has met semi-annually for three years. During this time the methods and results of various stages of the assessment and TMDL development processes have been presented to the group. A draft document will be made available to the citizens during the public comment phase.

2.13.3 Public Notice

Although no official public comments were solicited by IDEQ concerning the SBA phase of the TMDL development, comments were received and incorporated into the draft SBA-TMDL. An official 30-day public notice and comment period for the Draft SBA-TMDL will commence on November 20, 2000. The document will be finalized and presented to USEPA December 31, 2000.

3.0 BRUNEAU RIVER SUBBASIN TMDLS

3.1 In-Stream Water Quality Targets

In-stream water quality targets were chosen from a variety of sources. Principally, the Idaho Water Quality Standards were used to set in-stream targets. When the water quality standards related beneficial use impairment to a narrative standard; however , (e.g., IDAPA §58.01.02.200.03 "...surface waters shall be free from deleterious materials in concentrations that impair beneficial uses.") other sources were consulted to determine appropriate in-stream water quality targets. Other sources used to determine appropriate in-stream water quality targets were the Clean Water Act, the Code of Federal Regulations, USEPA technical support documents and guidelines, other states water quality standards, other TMDLs written by the state of Idaho and submitted to or approved by USEPA, and scientific papers from refereed journals. In-stream water quality targets developed from sources other than the state of Idaho's water quality standards will be reviewed at such time that numeric standards are adopted and codified by the state of Idaho following negotiated rule making. Targets were developed for four pollutants found to be impairing the beneficial uses of the listed waterbodies identified in previous sections of the subbasin assessment. These pollutants are nutrients, bacteria, sediment and low dissolved oxygen. Other pollutants have been demonstrated to be not degrading the beneficial uses in the various listed waterbodies. In addition, temperature and flow alteration will be addressed at such time that the state of Idaho has developed a TMDL policy concerning flow alteration as a pollutant and temperature studies of the Bruneau River and Jacks Creek are completed. The temperature studies will be needed to assess the quantity of natural geothermal waters discharged into both systems. In addition, an IDEQ temperature standards study will further determine the magnitude of the temperature issues in the systems.

3.1.1 Nutrients

Two segments in the Bruneau River Subbasin do not meet the narrative standard for nutrients. Therefore, these segments will be considered for application of a TMDL for restoration and protection of designated beneficial uses. Water quality will be restored through the TMDL process and the subsequent implementation plans developed by the land management agencies. The TMDLs will establish a limit on the quantity of nutrients that may enter the segments from sources in the local watersheds. The nutrient limits will be set at a level such that the segments will not exceed the estimated load capacities supportive of a good to excellent fisheries, and will allow the water quality to improve to restore degraded beneficial uses. These targets shall be a monthly average of 0.05 mg/L of TP with a daily maximum of 0.08 mg/L to allow for natural variability in the Bruneau River and Jacks Creek. The average monthly target is within the range identified by the USEPA as supporting beneficial uses of water flowing into lakes and reservoirs. TP target values of 0.05 mg/L and 0.080 mg/L do not imply that degradation by TP may occur up to the target value. Rather, TP values should be less than the respective targets on an average monthly basis and daily maximum, which will allow for some exceedances of the in-stream standards to account for seasonal and daily variation. However, it is IDEQ's administrative policy under IDAPA §58.01.02.050.01 that the adoption of water quality standards and the enforcement of such standards is not intended to conflict with the apportionment of water to the state through any of the interstate compacts or court decrees, or to interfere with the rights of Idaho appropriators, either now of in the future, in the utilization of the water appropriations which have been granted to them under the statutory procedure. Yet, IDAPA 58.01.02.50.02.a states: "Wherever attainable, surface waters of the state shall be protected for beneficial uses which for surface waters includes all recreational use in and on the water surface and the preservation and propagation of desirable species of aquatic biota." The existing and designated beneficial uses of these segments will be protected through the TMDL process as legally described. Acts of God and or uncontrollable flood/drought events will be exempt during the period of impact until such time that the impact is stabilized and the imminent and substantial danger to the public health or environment (IDAPA §58.01.02.350.02.a) is minimized so that the activity may be conducted in compliance with approved BMPs…to fully protect the beneficial uses (IDAPA §58.01.02.350.02.b.ii. (2)). Other activities that may cause degradation but which are outside the scope of IDAPA §58.01.02.050.01 and which there is foreknowledge of the event's occurrence will require a formal written letter from the individual, organization, or agency to IDEQ-TFRO about the nature of the potential event. If the activity violates IDAPA §58.01.02.350.02.b.i, such that it will occur in a manner not in accordance with approved BMPs, or in a manner which does not demonstrate a knowledgeable and reasonable effort to minimize the resulting adverse water quality impacts, then IDEQ-TFRO will seek intervention by the Administrator of IDEQ for preparation of a compliance schedule (as provided in Idaho Code 39-116). IDEQ may also institute administrative or civil proceedings including injunctive relief as provided in Idaho Code 39-108.

3.1.2 Dissolved Oxygen/Organic Enrichment

Concentration limits for dissolved oxygen established by the state of Idaho (dissolved oxygen exceeding 5 mg/L at all times, IDAPA §58.01.02.250.02(b)(I)) shall apply to Jacks Creek. The Jacks Creek dissolved oxygen TMDL will be based on a nutrient reduction TMDL. Consequently, surrogates for dissolved oxygen targets will be TP concentrations of 0.05 mg/L on a monthly average with a 0.08 mg/L daily maximum. By meeting the required nutrient reductions, excessive plant growth will be reduced to a beneficial level. This beneficial level of aquatic plants will reduce or eliminate the nighttime DO sags prevalent in systems overgrown with aquatic plants. Additionally, it can be surmised that during the seasonal senescence of the aquatic plant community, levels of biological oxygen demand will be reduced following a general reduction in plant biomass from the nutrient reductions proposed. This situation will allow for greater concentrations and saturation of oxygen in the system during the fall senescence period as well as other times of the year. Similar assumptions were made in other TMDLs submitted and approved by USEPA. For example, page 178 of the Upper Snake Rock TMDL (Submitted December 1999; Approved August 2000) states: "A water year of record similar to 1992 may occur once in 16 years (1983-1999) or a 6.3 percent chance that it would occur within a 16-year period. Since the Middle Snake River was

modeled under River Basin Model 10 for the worse case scenario, the model predicts that with TP reductions approximating an in-stream value of 0.075 mg/L TP would result in a DO value of about 8.56 mg/L which is well above the state's water quality standard. It is estimated that imposed TP reductions under the Mid-Snake TMDL will cause plant biomass to decrease between 20-60 percent, thus leading to levels below those considered to be "nuisance" and will likely restore beneficial uses. Therefore, no TMDL is proposed for DO on the Middle Snake River or its tributaries at this time."

Page 86 of the Middle Snake River Watershed Management Plan (Submitted March 1997; Approved April 1997) states: "The DEQ will utilize the RBM10 to compare the relative effectiveness of management actions and estimate the assimilative capacity of the Middle Snake River."

Page 91-92 of the Middle Snake River Watershed Management Plan (WMP) states that: "Plant biomass responds to nutrient reduction scenarios. In all reaches of the 30 river miles studied, the full implementation of WMPs resulted in 20-60 percent less plant biomass than no application of WMPs. This is evidence that a plant reduction goal of 30 percent is achievable and will lead to levels below those considered "nuisance" and likely restore beneficial uses in the Middle Snake River to some extent."

However, compliance with the dissolved oxygen TMDL will be determined in accordance to the water quality standards concerning dissolved oxygen mg/L and percent saturation. If at such time it is determined that the nutrient reduction TMDL is not sufficient to alleviate the low dissolved oxygen problems in Jacks Creek, a TMDL will be developed for another measurable or surrogate constituent such as BOD.

3.1.3 Bacteria

The state of Idaho has recently changed from a fecal coliform water quality standard to an *E. coli* standard for both primary and secondary contact recreation. All of the systems in the subbasin are undesignated waterbodies except the Bruneau River. These undesignated waterbodies are afforded protection for primary and secondary contact recreation according to IDAPA §58.01.02.101.01.a. After a review of the physical properties of the listed systems, IDEQ-TFRO has determined that likely recreational activities include fishing, wading, and infrequent swimming. These recreational activities are descriptive of the existing uses consistent with secondary contact recreation. As a result, the water quality bacteria targets will be those water quality criteria for secondary contact recreation. Thus, the number of cfu of *E. coli* shall not exceed a single instantaneous sample of 576 cfu/100 ml and the geometric mean of five samples collected in a 30 day period of 126 cfu/100 ml.

The development of an *E. coli* loading capacity presents a challenge because it is a most probable number measurement. Work done on the Upper Snake Rock TMDL (approved August 2000) used a 20 percent MOS, which translates to 25 cfu/100 ml below the standard (which is 126 cfu/100 ml). Therefore, a simple, first cut approach is to estimate a surrogate load using cfu (expressed as billions) as follows:

Load Capacity in cfu^9/day = Annual Average Flow (cms) x Target Concentration (cfu/100 ml) x 0.87.

The in-stream target concentration is 100 cfu/100 ml designed to protect below the recreation standard of 126 cfu/100 ml. This loading capacity does not reflect the imprecise nature of the *E. coli* most probable number analytical method, or the inherent variability of ambient *E. coli* concentrations. However, as new data and methods are developed to better address these challenges, the loading capacity will be refined and the TMDL revised.

Additionally, the target bacteria load (100 cfu/100 ml) will be segregated into percentages based on land uses. Thus, if 40 percent of the land use is attributable to agriculture, then 40 cfu/100 ml of the target will be distributed to agriculture. The remainder (100 - 40 = 60 cfu/100 ml) will be distributed to the other land uses where appropriate.

An essential assumption in this method of distribution is that the water quality standard is the load capacity of a system. By using a percentage of the load capacity, the calculations become unitless percentages, which overcomes the inherent problems of calculating loads from a parameter which does not lend itself to loading calculations. Allocations can then be made from this percentage of the load according to land use in the watershed. The MOS would be used to hold back a percent of the load from the load capacity.

Compliance with the water quality target and the TMDL will be based on the geometric mean (126 cfu/100 ml) for secondary contact recreation as described in the IDAPA regulations. Because the major exceedances occur primarily during the irrigation season (April through September), monitoring of the waterbodies will occur primarily during the irrigation season, although year-round monitoring may be developed so that comparisons between the irrigation and non-irrigation seasons can be assessed. It is recognized that bacteria is a singular parameter that has statistical significant linkage to total suspended solids. (See Upper Snake Rock TMDL for review of surrogate use of TSS for bacteria reductions.) During the implementation phase of this TMDL, land management agencies will provide guidance as to site-specific BMPs that will effectively reduce *E. coli*, such that conjunction with total suspended solids reductions will yield *E. coli* reductions, and eventually reach beneficial uses and/or state water quality standards by year 2005.

3.1.4 Sediment

The antidegradation policy for the state of Idaho (IDAPA §58.01.02.051(01)) indicates that the existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. Most of the listed segments in the Bruneau River Subbasin appear to be meeting the narrative standard for suspended sediment although they are listed for sediments in the 1998 303(d) list. Because of this, higher water quality for suspended sediment degradation of the water quality beyond these conditions shall not occur but shall be maintained at or below these levels through year 10 of plan implementation. The sediment limit, in the listed segments of the subbasin, will be set at a level such that the rivers and streams will not exceed the estimated load capacity supportive of a good fishery, and will not allow the water quality to degrade worse than current levels. This target shall be a monthly average of <50 mg/L of TSS with a daily maximum of 83 mg/L to allow for natural variability. The average monthly target is within the range identified by the European Inland Fisheries Advisory Commission (EIFAC 1965) and the Committee on Water Quality Criteria from the Environmental Studies Board of the National Academy of Science and National Academy of Engineers (NAS/NAE 1973) as supporting a moderate fishery. TSS values <50 mg/L does not imply that degradation by TSS may occur up to 50 mg/L. Rather, TSS values should be < 50 mg/L on an average monthly basis, which will allow for some exceedances of the in-stream standard to account for seasonal and daily variation. However, it is IDEQ's administrative policy under IDAPA §58.01.02.050.01 that the adoption of water quality standards and the enforcement of such standards is not intended to conflict with the apportionment of water to the state through any of the interstate compacts or court decrees, or to interfere with the rights of Idaho appropriators, either now of in the future, in the utilization of the water appropriations which have been granted to them under the statutory procedure. Yet, IDAPA 58.01.02.50.02.a states "Wherever attainable, surface waters of the state shall be protected for beneficial uses which for surface waters includes all recreational use in and on the water surface and the preservation and propagation of desirable species of aquatic biota." The existing and designated beneficial uses of the subbasin will be protected through the antidegradation as previously described. Acts of God and or uncontrollable flood/drought events will be exempt during the period of impact until such time that the impact is stabilized and the imminent and substantial danger to the public health or environment (IDAPA §58.01.02.350.02.a) is minimized so that the activity may be conducted in compliance with approved BMPs…to fully protect the beneficial uses (IDAPA §58.01.02.350.02.b.ii. (2)). Other activities that may cause degradation but which are outside the scope of IDAPA §58.01.02.050.01 and which there is foreknowledge of the event's occurrence will require a formal written letter from the individual, organization, or agency to IDEQ-TFRO about the nature of the potential event. If the activity violates IDAPA §58.01.02.350.02.b.i, such that it will occur in a manner not in accordance with approved BMPs, or in a manner which does not

demonstrate a knowledgeable and reasonable effort to minimize the resulting adverse water quality impacts then IDEQ-TFRO will seek intervention by the Administrator of IDEQ for preparation of a compliance schedule (as provided in Idaho Code 39-116). IDEQ may also institute administrative or civil proceedings including injunctive relief as provided in Idaho Code 39-108.

Jacks Creek is the lone exception in the subbasin in that it is seasonally affected by excess suspended sediment. As a result, sediment targets will be developed and load capacities determined. However, these targets will be based on the nutrient reduction TMDL proposed for Jacks Creek and therefore the nutrient targets will serve as surrogates for any proposed sediment reduction targets, load capacities, and allocations. These targets shall be a monthly average TP concentration of no more that 0.05 mg/L with a daily maximum of no more that 0.08 mg/L TP. As seen in Figure 21. a strong relationship exists between TSS and TP in Jacks Creek. This relationship is based in part to the physical nature of TP molecules to adhere to suspended sediment particles and the land use practices in the watershed that contribute both TP and suspended sediment. Therefore any reduction in TP is most likely to come from the same BMPs that would reduce sediment. Furthermore, as seen in the TSS TP relationship (Figure 21.) TP reductions to approximately 0.2 mg/l should result in TSS levels meeting the above targets (<50mg/L monthly average) for support of salmonid populations (cold water biota and salmonid spawning). However, further TP reductions are proposed for Jacks Creek. The current targets for the stream are set at 0.05 mg/l monthly average. This level of phosphorus reductions should, theoretically, reduce TSS levels to background levels. Because the nutrient TMDLs goals far exceed the goals that will be established for a sediment reductions TMDL compliance with the sediment reduction goals shall be determined when Jacks Creek attains < 50 mg/L TSS monthly average and an 83 mg/L daily maximum.

In addition to the above suspended sediment targets, IDEQ has developed site-specific surrogate targets for bedload sediment in the Bruneau subbasin. This surrogate is percent substrate surface fines. Surface fines are often increased with destabilization of banks and overgrazing (Bauer and Burton 1993). In low velocity streams, this sediment is often in the bedload form. In higher velocity streams the associated sediment is entrained in the water column as suspended sediment. However, much of this is also dependent upon the particle size. As particle size increases, the bedload component becomes more important than the suspended component. As substrate sedimentation increases the beneficial uses of a stream can be impaired through a reduction in food production and in the loss of trout habitats. Additionally, it has been determined from other studies (Rich et al 1992) that survival of early life history stages of salmonids are directly influenced by the amount of substrate surface fines. However, document appropriate targets for surface fines has been more complicated than simply documenting the link to beneficial use impairment (IDEQ 1997). To overcome this shortcoming, IDEQ has assumed that the biota in the impaired stream should respond in a positive manner if the surface fines are reduced to levels found in similar streams with fully supported beneficial uses. Although it is unknown just how responsive the biota will be to the target, and therefore to the required reductions needed for restoration of the beneficial uses. Consequently, IDEQ has assumed that if a statistically significant reduction in the percent fines should occur then the biota in the impaired stream will show a response similar to the mathematical response. Through adaptive management loops built into this TMDL (see section 3.7.6) further refinement of the target and required reductions can be made if the mathematical response is not enough to restore beneficial uses.

The substrate surface fines target for Three Creek will be based on the measured substrate surface fines in Big Flat Creek plus a MOS. The measured value in Big Flat was 42.45 percent fines less than 6 mm in diameter. In order to ensure that the target will restore beneficial uses, a 20 percent MOS was added to the calculations bringing the target to 34 percent surface fines. Compliance with this target will be at that time that the surface fines in Three Creek are no longer statistically significantly different from the target.

For the purposes of calculating the required sediment loads for a TMDL, IDEQ will estimate the bedload in Three Creek from accepted estimation techniques. In systems such as Three Creek, the bank material is composed mainly

of sands and clays bedload can be estimated as a percentage of the suspended load. The percentage usually applied to streams of this type is within the range of 25-150 percent. IDEQ chose a very conservative approach to determine the bedload in Three Creek. IDEQ used the 150 percent figure to determine bedload. In addition, IDEQ incorporated the critical seasonal component of the transport of the sediment loads. The average TSS load from the end of the spring runoff period was used to estimate bedload. At this time of year the velocity of the stream is sufficient to mobilize sediment, both suspended and bedload, within the channel. Additionally, the majority of bedload is transported during high flows and on the falling limb of the hydrograph (Gordon et al 1992) which correspond with the end of the spring runoff period.

3.2 Critical Periods and Seasonal Variation

Typically, critical periods are those times of the year in which the beneficial uses are the most vulnerable to damage or impairment by a pollutant. Critical periods vary from stream to stream for various pollutants. One of the reasons for such variability is the different land use practices along each stream. Other factors also increase loadings at different times of the year from pollutant to pollutant. For example, TP and sediment may impair a beneficial use on a stream at different times of the year. Typically, sediment is more likely to impact a system in the spring runoff during higher flow, while TP will impact a stream at during summer growing seasons. Therefore, the critical periods for each stream and each pollutant will be discussed separately.

3.2.1 Bruneau River

The data collected and presented by IDEQ in section 2.4.1 of this report suggests that the critical period for nutrient impairment in the Bruneau River begins in the late summer when excess nutrients are present in the system. However, as hypothesized the land use practices along the reach may continue contribute excess nutrients through the winter period. These nutrients may be stored in the sediments of the river for uptake the next year or could be exported into the receiving reservoir. The seasonal component that may influence the timing of excess nutrients in the system may be caused by water quality in the upper portions of the watershed diluting any effects from the land use practices in the lower portions of the watershed. This dilution effect begins to erode as discharge in the system approaches base flow during the late summer. To compound the situation during this critical period, a majority of the pastures located along the rivers edges are used for grazing. Cattle concentrations are lower outside of the critical period when the cattle have been moved to rangelands in other watersheds. Data from the average annual hydrograph (see figure 16) suggests that the discharge value of 5.66 cms typically marks the beginning and end of low base flow. Discharge approaches this critical value near the third week of July and again near the middle of February. Subsequently, the nutrient load capacity will be developed for the months of July through February with this value. Outside of the critical period, the load capacity will be based on the average discharge from March through July. This value is 21.32 cms.

3.2.2 Jacks Creek

3.2.2.1 Nutrients

The data collected and presented by IDEQ in section 2.4.2 of this report suggests that the critical period for nutrient impairment in Jacks Creek is dissimilar to that of the Bruneau River. Nutrients are elevated in the system at all times. Measured concentrations were at maximum levels early in the growing season and fell only slightly throughout the summer. Corresponding with these differences in systems is the amount of irrigated agriculture in Jacks Creek compared to that in the Bruneau River lower watershed. More of the Jacks Creek watershed is used for irrigated agriculture than is the lower Bruneau Valley. Additionally, limited discharge occurs in the system from the upper watersheds of Big and Little Jacks Creeks so the dilution effect seen in the Bruneau River is minimized. In fact, the majority of water in the Jacks Creek system is derived from agricultural waste waters and aquaculture

facilities. The data collected by IDEQ and the current land use practices in the Jacks Creek watershed indicate that TP loading into the system increases just after spring runoff and continues through the irrigation season. Additionally, some of the areas adjacent to the stream are used as spring and winter pastures for range cattle, increasing the likelihood of elevated TP levels during the winter. With the apparent year-round elevated loadings of TP from a variety of sources, no seasonal component can be clearly seen. However, the beneficial uses in the stream are more likely to be impaired in the early spring through summer period. This period is the time of year when the aquatic plant community is growing the most rapidly thereby creating the nuisance aquatic vegetation water quality standard violations. The load capacity during this critical growing season period would be based on the some value from the descending limb of the annual hydrograph. As a conservative approach, IDEQ will use the low, average, summer flow which will result in a lower load capacity than would using an average discharge of spring to summer flows. Data collected by IDEQ indicates that this value is 0.14 cms (see figure 17).

3.2.2.2 Dissolved Oxygen

The critical period for low dissolved oxygen in Jacks Creek is unknown at this time due to data gaps in the monitoring record. However, the critical period can be determined from the life history and biology of the aquatic plant community that is likely to cause the impairment. It is known that as the aquatic plant community increases that nighttime DO levels drop due to the dark respiration phase of a plants metabolic cycle. What is unknown is the time of year that the community becomes large enough to cause the DO levels to drop below state water quality standards. The most likely time of year for this to occur is early to mid summer. It is unlikely that the community would be large enough in the spring to cause such impairment as the community has just begun to grow. Given the amount of excess nutrients in the system, IDEQ feels confident that an excessive amount of plant biomass can and does occur in the system. It is assumed that by the early part of the summer nighttime DO sags occur.

An additional factor in the life history of the aquatic community extends the critical period through the summer into the fall of any given year. As the community matures, most aquatic plants begin to slough off biomass. When this excess biomass begins to decompose, the biological oxygen demand increase further depleting a system of the required DO. As water temperatures and light levels begin to drop, more of the plant community begins to senesce. With this senescence, more oxygen is depleted due to the decay of the now large amounts of plant biomass.

IDEQ will base the DO critical period on the above assumptions. Therefore, the critical period is the time of year when the aquatic plant community is just past the time in which the plants are growing the most rapidly thereby creating the nuisance aquatic vegetation water quality standard violations through the end of fall when most of the plant have died back and have begun the decay process. The load capacity during this critical period would be based on some value between the end of the descending limb of the annual hydrograph and the beginning of winter low flow. As a conservative approach, IDEQ will use the average low summer flow, which is 0.14 cms.

3.2.2.3 Bacteria

The data collected and presented by IDEQ in section 2.4.2 of this report suggests that bacterial contamination occurs almost year-round. Bacteria counts are at elevated levels in the system at all times. Measured concentrations were at maximum levels early in the growing season and fell only slightly throughout the summer. Bacteria contamination began to increase again in the fall. The data collected by IDEQ and the current land use practices in the Jacks Creek watershed indicate that bacteria loading into the system increases just after spring runoff, and goes through the irrigation season. Additionally, some of the areas adjacent to the stream are used as spring and winter pastures for range cattle, increasing the likelihood of elevated bacteria contamination levels during the winter. With the apparent year-round elevated loadings of bacteria from a variety of sources, no seasonal component can be clearly seen. However, the beneficial uses in the stream are more likely to be impaired in the summer through the winter. This is the time of year when the creek will likely be used for the recreational activities such as fishing and

duck hunting. The load capacity during this critical use period would be based on the some value from summer or winter base flow limb of the annual hydrograph. As a conservative approach, IDEQ will use the low, average, summer flow regime of 0.14 cms.

3.2.2.4 Sediment

The data collected and presented by IDEQ in section 2.4.2 of this report suggests that suspended sediment is elevated in Jacks Creek in the early spring during higher flows. The potential beneficial use impairment from this seasonal spike in suspended sediments is warm water biota and recreational uses. The warm water biota would be impaired by a potential loss (suffocation) of eggs in warm water fishes as the males are guarding the nests. Crappie begin this activity as water temperatures reach 14EC and in Jacks Creek this corresponds with end of May first of June. Flows during this period are typically near low summer flows. Therefore, IDEQ will use 0.14 cms (see figure 17) as the design flow for the sediment TMDL as well as for the Bacteria and Nutrient reduction TMDLs.

3.2.3 Clover Creek

The data collected and presented by IDEQ in section 2.4.6 of this report suggests that bacterial contamination occurs at the end of the summer period in Clover Creek. However, the bacteria counts are at relatively low levels in the system at most times. The data collected by IDEQ and the current land use practices in the Clover Creek watershed indicate that bacteria loading to the system has the potential to increase during the rangeland-grazing season depending on rotational patterns within the various allotments. Consequently, IDEQ will assume that the beneficial uses in the stream are more likely to be impaired in the late summer period. The load capacity during this critical use period would be based on a base flow rate on the annual hydrograph. As a conservative approach, IDEQ will use the low, average, summer flow. Because discharge in this stream approaches zero in some years during the summer, IDEQ will use the minimum flow value to which water quality standards apply. This value is 0.03 cms.

3.2.4 Three Creek

The data collected and presented by IDEQ in section 2.4.7 of this report suggests that suspended sediment impairment does not occur at any time in Three Creek. However, surface fines measurements taken in the late summer indicate that beneficial use impairment has occurred. Based on best professional judgment, IDEQ assumes that the surface fines measurements would likely be at maximum levels following spring runoff and into low flow periods. During these times water velocity would not be sufficient to entrain the sediment into the water column and transport it out of the system. Additionally, during this period growth and production of the aquatic invertebrates would be limited due to habitat homogenization. Salmonid spawning and rearing habitats would be impaired until higher velocity flows returned to the system in the form of a spate or the following year's runoff. The data collected by IDEQ and the current land use practices in the tributary watershed indicate that sediment loading to the system has the potential to increase during the rangeland-grazing season as bank erosion is increased due to mechanical erosion of the banks by the cattle. Consequently, IDEQ will assume that the beneficial uses in the stream are more likely to be impaired in the late spring through summer. The load capacity during this critical use period would be based on the some value from summer base flow limb of the annual hydrograph. As a conservative approach, IDEQ will use the low, average, summer flow regime. Because discharge in this stream approaches zero in some years during the summer, IDEQ will use the minimum flow value to which water quality standards apply. This value is 0.03 cms.

3.3 Estimate of Existing Pollutant Wasteloads from Point Sources

This section describes the pollutant loads from the various point sources located within each segment. The wasteload estimates from the two sources were estimated from design capacity and permit limits provided under the specific facilities NPDES permit.

3.3.1 Bruneau River

There are no point sources located within the watershed of the Bruneau River.

3.3.2 Jacks Creek

There are two point sources located within the watershed of Jacks Creek (Table 26).

Table 26. POINT SOURCES WITHIN THE JACKS CREEK WATERSHED.

Facility **May 2000 Discharge Monitoring Report**	**Permit Numbers**	**Discharge (cms)**	**Monthly Average Concentration Limit mg/L TSS (Permit Limit 0.2 mg/L)**	**Wasteload pounds/day**
Ace Development USA, Inc.	New # IDG130123 Old permit # ID0027871	0.08	0.49 mg/L	3.39 kg/day
Arraina Inc.	New # IDG130122 old permit # ID0027863	0.1	0.25 mg/L	2.16 kg/day
Total				5.55 kg/day

3.3.3 Sugar Creek

There are no point sources located within the watershed of Sugar Creek.

3.3.4 Wickahoney Creek

There are no point sources located within the watershed of Wickahoney Creek.

3.3.5 Hot Creek

There are no point sources located within the watershed of Hot Creek.

3.3.6 Clover Creek

There are no point sources located within the watershed of Clover Creek.

3.3.7 Three Creek

There are no point sources located within the watershed of Three Creek.

3.3.8 Cougar Creek

There are no point sources located within the watershed of Cougar Creek.

3.3.9 Poison Creek

There are no point sources located within the watershed of Poison Creek.

3.4 Estimate of Existing Loads from Nonpoint Sources

Estimates of existing nonpoint source pollutants were based on the best available data at the time of this writing. In all instances, the land uses (as defined by IDWR GIS coverages using fifth field HUCs or stream corridor model) and the corresponding percentages of those land uses were used to partition the loads. The loads for a particular land use were developed by applying the percentages from above to an estimated total load developed from monitoring results and flow in the various segments and tributaries. See Tables 27 through 30.

3.4.1 Bruneau River

Table 27. EXISTING NONPOINT SOURCE NUTRIENT LOADS IN THE BRUNEAU RIVER SEGMENT

Land Use Watershed Approach	Percent Use	Critical Period Estimated Nutrient Load from Monitoring and Average Annual Hydrograph (kg/day)	Non-critical Period Estimated Nutrient Load from Monitoring and Average Annual Hydrograph (kg/day)
Dryland Agriculture	0.3	0.09	0.16
Irrigated Agriculture	30.8	9.33	16.94
Range Land	64.5	19.55	35.48
Riparian and water	4.4	1.33	2.42
Total	100.0	30.31	55.00

3.4.2 Jacks Creek

Table 28. EXISTING NONPOINT SOURCE LOADS IN JACKS CREEK AND SUGAR VALLEY WASH

Land Use- River Corridor Approach	Percent Use	Estimated Nutrient Load from Monitoring (kg/day) (May 2000)	Estimated Bacteria Load from Monitoring (CFU^9/day)
Irrigated Agriculture (gravity)	19.1	1.14	40
Irrigated Agriculture (Sprinkler)	33.2	1.98	70
Range Land	42.8	2.55	90
Riparian and Water	4.9	0.29	10
Total	100.0	5.96	210

3.4.3 Clover Creek

Table 29. EXISTING NONPOINT SOURCE LOADS IN CLOVER CREEK

Land Use- Watershed approach	Percent Use	Estimated Bacteria Load from Monitoring (CFU^9/day)
Range Land	88.6	97
Riparian	11.4	13
Total	100.0	110

3.4.4 Three Creek

Table 30. EXISTING NONPOINT SOURCE SEDIMENT LOADS IN THREE CREEK

Land Use- Watershed approach	Percent Use	Estimated Sediment Bed Load (kg/day) Estimated from TSS Load and Hydrological Guidelines
Range Land	83.1	446.79
Irrigated Agriculture	3.2	17.24
Riparian	13.7	73.48
Total	100.0	537.51

3.5 Load Capacity and Margin of Safety

The Clean Water Act requires that a TMDL be developed from a load capacity. A load capacity is the greatest amount of load that a water body can carry without violating water quality standards. In those instances where there are numeric water quality standards, the load capacity of a water body for different pollutants can be very straightforward. Those pollutants in the Bruneau River TMDL; however , do not apply to numeric water quality standards; rather they apply to the narrative standards (e.g.. IDAPA§ 58.01.02.200.03 "...surface waters shall be free from deleterious materials in concentrations that impair beneficial uses"), as referenced in section 3.1 of this document. As a result, the load capacity of the various segments and tributaries in the Bruneau River Subbasin were estimated from the flow records available from USGS or IDEQ, and a variety of sources relating concentrations of pollutant to effects on "beneficial uses" or aquatic communities. Other sources used for concentrations were the Clean Water Act, the Code of Federal Regulations, USEPA recommendations and guidelines, other states water quality standards, other TMDLs written by the state of Idaho and submitted to or approved by USEPA, and scientific papers from refereed journals. Load capacities developed from sources other than the state of Idaho's water quality standards will be reviewed at such time that numeric standards are adopted and codified by the state of Idaho following negotiated rule making. Additionally, load capacities were developed from flow regimes identified as critical periods. In some cases, these critical periods were low flow conditions during a particular season. In other cases, the flow regime during the critical period was determined to be at or near zero. In these cases, the lowest flow that water quality standards apply, which is 0.14 cms for recreational uses and 0.03 cms for aquatic life uses (IDAPA §58.01.02.070.07) was used to determine load capacity.

In addition to estimating a load capacity a given water body can carry, the Clean Water Act includes statutory requirements for a MOS in a TMDL. The MOS is intended to account for uncertainties in available data or in the actual effect controls will have on load reductions and the receiving water body's water quality. The MOS may be implicit, such as conservative assumptions used in various calculations, specifically those of loading capacity, wasteload allocations, and load allocations. Otherwise, a MOS must be clearly defined. For the Bruneau subbasin TMDLs, an explicit MOS will be set at 10 percent for all pollutant water body combinations. In addition, any conservative approaches used in the various calculations required by a TMDL will be included as an implicit component of the MOS. The implicit MOS; however , will not be clarified further. Rather, it will be assumed that conservative approaches taken throughout the document will have been sufficiently identified in appropriate sections.

The load capacity and loading analysis models for the various streams and pollutants were derived from a mass balance approach of monitoring data, upstream monitoring, downstream monitoring, source monitoring, and estimations of loads from that data. Links to the water quality targets and beneficial uses were drawn from other TMDLs completed by the state of Idaho, USEPA guidelines and recommendations, and scientific literature sources.

The equations used to determine the different load capacities for the various waterbodies follow the general formula:

Target * Critical Period Discharge * Conversion Constant = Load Capacity.

The Bruneau River nutrient load capacity:

0.05 mg/L TP * 5.66 cms * 5.39 = 53.9 pounds/day TP (during the critical period)
0.05 mg/L TP * 21.32 cms *5.39 = 202.9 pounds/day TP (during the non-critical period)

Jacks Creek Nutrient Load Capacity

0.05 mg/L TP * 0.14 cms * 5.39 = 1.35 pounds/day TP

Jacks Creek Bacteria Load Capacity

100cfu * 0.14 cms * 0.87 = 12 cfu^9/day

Three Creek Sediment Load Capacity

50 mg/L TSS * 1.5 (TSS bed load conversion) *0.03 cms * 5.39 = 404.25 pounds/day

Clover Creek Bacteria Load Capacity

100cfu * 0.14 cms * 0.87 = 12 cfu^9/day

3.6 Total Maximum Daily Loads

The following tables (31 through 35) are the load capacity, background, wasteload allocations, load allocations, and unallocated loads for each segment and pollutant in the Bruneau River Subbasin.

3.6.1 Bruneau River Nutrient TMDL

Table 31. BRUNEAU RIVER NUTRIENT ALLOCATIONS

Facility or Land Use	Load Capacity kg/day	Background	Margin Of Safety	Wasteload Allocation	Load Allocation
Dryland Agriculture					0.06
Gravity Irrigated Agriculture					2.56
Sprinkler Irrigated Agriculture					2.97
Rangeland					11.73
Riparian					0.79
CAFOs				0.0	
Total	24.45	4.02	2.44	0.0	17.98

3.6.2 Jacks Creek Nutrient TMDL

Table 32. JACKS CREEK AND SUGAR VALLEY WASH NUTRIENT ALLOCATIONS

Facility or Land Use	Load Capacity kg/day	Margin Of Safety	Wasteload Allocation	Load Allocation
Gravity Irrigated Agriculture				0.055
Sprinkler Irrigated Agriculture				0.096
Rangeland				0.124
Riparian				0.014
Arraina Inc.			0.14	
Ace Development USA, Inc			0.12	
CAFOs			0.0	
Total	0.61	0.06	0.26	0.29

3.6.3 Jacks Creek Bacteria TMDL

Table 33. JACKS CREEK AND SUGAR VALLEY WASH BACTERIA ALLOCATIONS

Facility or Land Use	Load Capacity cfu^9 /day	Margin Of Safety	Wasteload Allocation	Load Allocation
Gravity Irrigated Agriculture				2
Sprinkler Irrigated Agriculture				4
Rangeland				5
Riparian				0
Arraina Inc.			0	
Ace Development USA, Inc			0	
CAFOs			0	
Total	12	1	0	11

3.6.4 Three Creek Sediment TMDL

Table 34. THREE CREEK SEDIMENT ALLOCATIONS

Facility or Land Use	Load Capacity kg/day	Margin Of Safety	Wasteload Allocation	Load Allocation
Irrigated Agriculture				5.28
Rangeland				137.15
Riparian				22.61
CAFOs			0	
Total	183.37	18.33	0	165.04

3.6.5 Clover Creek Bacteria TMDL

Table 35. CLOVER CREEK BACTERIA ALLOCATIONS

Facility or Land Use	Load Capacity cfu^9 /day	Margin Of Safety	Wasteload Allocation	Load Allocation
Rangeland				10
Riparian				1
CAFOs			0	
Total	12	1	0	11

3.7 Reasonable Assurances and Implementation Schedule

The objective of the Bruneau River TMDL is to allocate allowable loads among different pollutant sources so that the appropriate control actions can be taken and water quality standards achieved. The total pollutant load to a water body is derived from point, nonpoint, and background sources. The Bruneau River TMDL has attempted to consider the effect of all activities or processes that cause or contribute to the water quality limited conditions of not

just the waterbodies listed on the 1998 §303(d) list, but rather all potential sources. Control measures to implement this TMDL are not limited to NPDES authorities, but are based on the reasonable assurance that state and local authorities and actions to reduce nonpoint source pollution will also occur. "There must be assurances that nonpoint source control measures will achieve expected load reductions in order to allocate a wasteload to a point source with a TMDL that also allocates expected nonpoint source load reductions (USEPA 1991)." The Bruneau River TMDL has load allocations and wasteload allocations calculated with margins of safety to meet water quality standards. The allocations; however , are based on estimates that have used available data and information. Therefore, monitoring for the collection of new data is necessary and required. For the Bruneau River TMDL the reasonable assurance that it will meet its goal of water quality standards is based on three components: 1) point source NPDES permits that will require monitoring for the generation of new data that will be used for wasteload allocation concerns; 2) nonpoint source implementation of BMPs based on land management agencies' assurance that reductions will occur; and 3) trend monitoring that will be used to document relative changes in various aquatic organism populations and in physical and chemical water quality parameters over a 10-year period in conjunction with data from various agencies, organizations, and water user industries that will assess overall progress towards attainment of water quality standards and related beneficial uses.

3.7.1 Point Source

"Both technology-based and water quality-based controls are implemented through the NPDES permitting process. Permit limits based on TMDLs are called water quality-based limits. Wasteload allocations establish the level of effluent quality necessary to protect water quality in the receiving water and ensure attainment of water quality standards. Once allowable loadings have been developed through wasteload allocations for specific pollution sources, limits are incorporated into NPDES permits" (USEPA 1991).

For the Bruneau River Subbasin, the following table (Table 36) describes the short-term and long-term goals that are prescribed for point source industries and IDEQ-TFRO that will insure reasonable assurance that point sources will comply with their reduction plans per pollutant.

Table 36. SHORT- AND LONG-TERM GOALS FOR POINT SOURCES AND IDEQ ON A POLLUTANT BASIS

Nutrients	Explore alternative nutrient reduction methodologies; work with IDEQ-BRO to ensure compliance with nutrient TMDL
Sediment	Continue monitoring suspended solids as a component of nutrient reductions
Low DO	Meet DO targets; assess nutrient reduction goals to determine compliance with DO TMDL
Temperature	Re-evaluation of temperature criteria via project study by IDEQ-State Office
Flow	No flow TMDL; Conservation flows encouraged

3.7.2 Nonpoint Source

"When establishing permits for point sources in the watershed, the record should show that in the case of any credit for future nonpoint source reductions: 1) there is reasonable assurance that nonpoint source controls will be implemented and maintained; or 2) that nonpoint source reductions are demonstrated through an effective monitoring program "(USEPA 1991). Essentially, reasonable assurance for nonpoint sources means that unenforceable actions will result in the load allocations for nonpoint sources required by the Bruneau River SBA-TMDL. At a minimum, this includes the following five assurances.

1. Demonstration of the availability of funds to implement the unenforceable actions (USEPA 1998). Funding sources currently available include §319, SAWQP, Environmental Quality Incentive Program (EQIP) (USDA-

NRCS), and Conservation Reserve Program (CRP) (USDA-NRCS-Farm Service Agency). §319 funding as a consequence of the §303(d) list process has taken on a more focused approach in screening TMDL implementation. For example, it is quite possible that linkage to a TMDL within a project area would carry a more favorable view, particularly if it were linked to its TMDL implementation activity. The implementation of BMPs from a holistic resource management system approach that addressed all pollutant sources could be considered important as well. In addition, the support from an existing watershed advisory group could carry some weight in the project being considered. SAWQP, on the other hand, is currently undergoing revision via Senate Bill 1135 that considers "Program Neutral Planning", or implementation planning. A 3-tier approach, much like the stream corridor model, is used to consider the riparian corridor, the adjacent lands, and the uplands. The 1996 USDA Farm Bill Conservation Provisions, EQIP, became promulgated as a final rule on May 22, 1997. The purposes of the program are achieved through the implementation of a conservation plan that includes structural, vegetative, and land management practices on eligible land on 5- to 10-year contracts. Finally, the CRP is aimed at reducing soil erosion, reducing sedimentation into streams and lakes, and protecting food and fiber, and thus improves water quality through establishing wildlife habitat and enhancing forest and wetland resources. Through cost sharing, farmers are encouraged to convert highly erodable cropland or other environmentally sensitive acreage to vegetative cover, wildlife plantings, trees, filter strips, or riparian buffers. According to NRCS, each acre under CRP contract reduces erosion by an average of 19 tons of topsoil per year. Additional funding sources for water quality improvements are available. Therefore, the Bruneau Subbasin citizen groups will, upon acceptance of the Bruneau River TMDL, seek after such available funds with the express purpose of funding implementation projects that strive to clean up the water quality listed streams.

2. "Description of the process for entering into any necessary agreements (such as with various federal, state, and local agencies/entities, private landowners, others) to carry out such unenforceable actions and the probability of success in achieving such agreements" (USEPA 1998). IDEQ-TFRO is prepared to discuss with any federal, state, local agency/entity, or private landowner the possibility of carrying out such unenforceable actions through the signing of necessary agreements to achieve success on the water quality limited water bodies. Such agreements will be pertinent to the restoration of beneficial uses and water quality standards and may include water quality monitoring. Additionally, IDEQ-TFRO supports the USFS and USBLM Protocol for Addressing Clean Water Act Section 303(d) Listed Waters (USFS, USBLM, USEPA 1999) which is to "protect and maintain water quality where standards are met or surpassed, and restore water-quality-limited waterbodies within their jurisdiction to conditions that meet or surpass standards for designated beneficial uses."

3. "An assessment of the likelihood of continuation of governmental programs (e.g., Conservation Reserve Program) that are planned to assist in implementation" (USEPA 1998). According to the most recent survey by the U.S. Department of Commerce on the availability of funds over the next 15-20 years it is estimated that 10-15 percent of the national budget will be increased from the current 5-10 percent. state funding in Idaho is already ongoing due to Idaho Code §39-3601 et seq. and all that relates to this for point and nonpoint source industries. Current programs, like CRP and EQIP, will continue to be funded so long as they meet the full purposes for which they were funded. No funding program; however , is long-lived and is highly dependent on changes in administrative opinion.

4. "An analysis of the anticipated effectiveness of the management measures (a demonstration of how, if implemented, they will actually lead to desired reductions; an evaluation of the success of existing/prior programs calling for similar controls in the watershed or a similar watershed may be used in this analysis)" (USEPA 1998). CRP is not a new program, and has an erosion reduction potential of 19 tons/acre/year. Its viability is dependent on the number of new highly-erodable acres that are available in the area of concern. EQIP, on the other hand, is a new program and is evolving yearly to include new acreages that are directed at water quality limited stream segments. Currently, the Soil Conservation Commission, and the NRCS, in conjunction with local SCDs, are looking at funding sources for BMP development on several water quality limited stream segments.

5. "An estimate of the time required to attain applicable water quality standards and a demonstration that the standards will be met as expeditiously as practicable" (USEPA 1998). It is expected that management actions and control actions called for to implement the Bruneau River Subbasin TMDL will begin immediately after approval of the TMDL submittal to USEPA. The Bruneau River Subbasin TMDL is designed with the goal of expeditiously attaining compliance with water quality standards, particularly in defining and repairing water quality impairments through the stream corridor approach. It is the belief of IDEQ-TFRO that attainment of water quality standards and beneficial uses will be met as expeditiously as practicable within the 10-year allotted time frame with implementation of management and control actions. In the event that beneficial uses are not attained, then the feedback loop as a component of adaptive management in conjunction with monitoring will be used for re-evaluation for implementation of more stringent measures if needed. The following describes the proposed phased-approach at achieving beneficial uses and state water quality standards.

PHASE 1

Years 1-5
In the first phase, watersheds and stream corridors (within the 3 km) would be reviewed over a five year period for the development of critical acres that directly impact the segment. These critical acres would be defined by the land management agency during the implementation phase of the TMDL. Critical acres could include acreages outside the stream corridor if a portion of the area included the stream corridor. Within the first five years, all water quality limited stream segments would have land management plans developed that specifically target the reduction of listed pollutants. These land management plans become the critical focus of the implementation plan for nonpoint sources. Monitoring would be specifically defined to determine if BMPs were functional and the overall goals of the Bruneau River Subbasin TMDL were met.

Year 3
In year three, a preliminary evaluation of the water quality limited stream segments for BMP implementation via funding will be conducted by the land management agencies and IDEQ so that the goals of the Bruneau River Subbasin TMDL are being met.

Year 5
In year five, the land management agencies and IDEQ will conduct a re-evaluation of the land management plans and their funding, so those goals of the Bruneau River Subbasin TMDL are in compliance and being met.

PHASE 2

Years 5-10
In the second phase, or in years five-ten, critical acres would be defined for acres outside the stream corridor but within the fifth field HUC watersheds-of-concern that affect the water quality limited stream segments. These critical acres would be defined similarly as in the first phase and according to the engineering design(s) of the land management agencies. Critical acres could include acreages within the stream corridor if a portion of the acres were included outside the stream corridor. Land management plans would also be developed and included as addendums to the particular water quality limited stream segment.

Year 8
In year eight, the land management agencies and IDEQ will conduct a preliminary evaluation of additional segments in the watersheds-of-concern for compliance with the Bruneau River Subbasin TMDL.

Year 10
In year ten, the land management agencies and IDEQ will conduct a re-evaluation of the land management plans and their funding. Under the provisions of the Bruneau River Subbasin TMDL, the Bruneau River Subbasin citizen groups in conjunction with IDEQ would review the land management plans and the monitoring data to ascertain if beneficial uses and water quality standards have been met.

Years 10-15
If it is ascertained in year ten that beneficial uses and water quality standards are met, then the Bruneau River Subbasin TMDL will be maintained for an additional five years. If at the end of the additional five years beneficial uses and water quality standards are met by any or all water quality limited stream segments, then IDEQ with support of the industries will maintain the nonlisted status of those streams (assuming that imposed measures are continued and maintained). If it is determined in year ten that beneficial uses and water quality standards are not met, then a re-evaluation and re-allocation of more stringent permit limits for point sources will be conducted by USEPA and IDEQ, and more effective BMPs will be sought, defined, and implemented in the defined critical acres or in those areas that are causing the most damage to water quality by nonpoint sources.

6. "Measurable milestones for determining whether the implementation plan is being properly executed, and for determining whether applicable water quality standards are being achieved" (USEPA 1998). Short-term and long-term milestones are defined for point sources (see Table 36) and nonpoint sources (Table 37) and are sufficient to demonstrate adherence to the implementation plan. The measurable milestones include maintaining and meeting target reductions as defined in effluent permit limits for point sources, and maintaining and meeting target best management plans as defined by the land management agencies and the industry. Quantification of goals will be defined in an overall trend monitoring plan developed by IDEQ and the Bruneau Subbasin citizens groups. Additionally, the previous sub-section (5.) includes the phased-approach over a 10-year period for attainment of beneficial uses and state water quality standards by nonpoint source industries.

7. In accordance with §319 (a)(1)(C) of the Clean Water Act, IDEQ, in conjunction with land management agencies is prepared to identify additional BMPs and measures to control nonpoint sources causing or contributing to nonattainment of water quality standards, and provide for these sources to reduce, to the maximum extent practicable, the level of pollution they contribute (USEPA 1993). In conjunction with this provision, IDEQ with land management agencies shall:

a. review the BMPs and measures that were identified for nonpoint sources and revise them as necessary to assure that they continue to produce the maximum practicable pollution reduction;

b. identify any additional nonpoint sources (or classes of nonpoint sources) that should participate in achieving the goals of the Bruneau River Subbasin TMDL;

c. identify any additional management measures and/or controls that, to the maximum extent practicable, will reduce the pollution of concern from nonpoint sources in the effected water; and,

d. exercise or seek after any additional legal authorities to address nonpoint sources, as necessary, beyond those defined in the Idaho Agricultural Pollution Abatement Plan for irrigated agriculture, or the specific best management plans defined for rangeland, forestry, CFOs, and/or stormwater.

For the Bruneau River Subbasin, the following table describes the short-term and long-term goals that are prescribed for nonpoint source industries and IDEQ-TFRO that will insure reasonable assurance that nonpoint sources will comply with their reduction plans per pollutant.

Table 37. SHORT- AND LONG-TERM GOALS FOR NONPOINT SOURCES AND IDEQ ON A POLLUTANT BASIS

Pollutant	Industry	Year 1 (2001)	Year 3 (2003)	Year 5 (2005)	Year 8 (2008)	Year 10 (2010)
TP	Agriculture	Develop management plan and identify critical acres		Meet target BMP reductions	Maintain for 5 more years	Re-evaluation
	Grazing	Starting BMPs	Review target BMP reductions	Meet target BMP reductions	Maintain for 5 more years	Re-evaluation
	IDEQ and Land Mgmt Agency	Maintain database; review NPS efficacy data; seek funding		Review target BMP reductions	Review BMP maintenance	Review & evaluate BMPs
Percent Fines	CFOs	Zero Discharge		Evaluation	Zero Discharge	Re-evaluation
	Agriculture	BMP implementation along with some efficacy monitoring		Evaluation	Maintain for 5 more years	Re-evaluation
	Grazing	Starting BMPs	Review target BMP reductions	Evaluation	Maintain for 5 more years	Re-evaluation
	IDEQ and Land Mgmt Agency	Maintain data base; review NPS efficacy data; seek funding		Review target BMP reductions	Review BMP maintenance	Review and evaluate BMPs
DO	Meet TP goals					
Temperature	Re-evaluation of temperature criteria via project study by IDEQ-State Office					
Flow	No flow TMDL; conservation flows encouraged					
Industry Plans	Each industry will be responsible for the development of an annual summary review of assessment of water quality goals and targets for the Bruneau River Subbasin.					

3.7.3 Trend Monitoring Plan Goal

Idaho Code 39-3621 provides that the designated agencies, in cooperation with the appropriate land management agency and IDEQ shall ensure BMPs are monitored for their effect on water quality. The monitoring results shall be presented to IDEQ on a schedule agreed to between the designated agency and IDEQ. Where no monitoring program exits, or where additional assessments are needed, it is necessary for states to design and implement monitoring plans. The objectives of monitoring include assessing water quality standards attainment, verifying pollution source allocations, calibrating or modifying selected models, calculating dilutions and pollutant mass balances, and evaluating point and nonpoint source control effectiveness. In their monitoring programs, states should include descriptions of data collection methodologies and quality assurance/quality control procedures and a review of current discharger monitoring reports. When possible, states should be integrated with volunteer and cooperative monitoring programs. The monitoring programs will provide a sufficient database for assessment of water quality standard attainment and additional predictive modeling if necessary (USEPA 1991). In effect, monitoring provides the information needed to evaluate management. Implementing BMPs and monitoring trends will be used to determine which management measures and BMPs are being implemented, whether management measures and BMPs are being implemented as designed, and the need for increased efforts to promote or induce use of management measures and BMPs. It may be necessary to modify current or proposed monitoring programs to those that are more in line with an adaptive management style for the watershed. See section 3.7.6 for more information on feedback loop and adaptive management. Data from implementation monitoring, used in combination with trend monitoring, will be useful in meeting the following objectives.

1. To evaluate BMP effectiveness for protecting soil and water resources. The plan will assess whether management measures or control actions are being implemented as planned and if they are effective. This is critical to the efficacy monitoring that will be conducted by all industries and IDEQ and to the trend monitoring plan so as to meet the goals and demands of the Bruneau River Subbasin TMDL in meeting beneficial uses and water quality standards. Idaho Code 39-3603 provides that "the existing in-stream beneficial uses of each water body and the level of water quality necessary to protect those uses shall be maintained and protected." Only through water quality monitoring and BURP assessment can the achievement of water quality goals be determined.

2. To identify areas in need of further investigation.

3. To establish a reference point of overall compliance with BMPs. Efficacy monitoring will be the responsibility of all industries and IDEQ. Establishing a reference point to bring about comparison statistics is critical to the success of the trend monitoring plan, or any monitoring plan that supports the Bruneau River Subbasin TMDL. Such compliance points in the Bruneau River Subbasin will include the Bruneau River at Highway 51 bridge, Jacks Creek at Highway 78 crossing, Clover Creek at Clover Crossing, and Three Creek at confluence with Clover Creek. Compliance points for all tributaries and irrigation return flows will be at the confluence where they discharge to the water quality limited stream segment.

4. To determine whether farmers are aware of BMPs. Farmers includes operators of farm sites (irrigated and non-irrigated) and ranchers (grazing). Understanding and applying the correct BMPs is not only the responsibility of the farmer, but also the land management agency. Only those BMPs described as "authorized BMPs" will be considered, unless the land management agency promotes and supports a BMP that is not listed or authorized. IDEQ will support BMPs that are defined in the Idaho Agricultural Pollution Abatement Plan according to the NRCS, the Soil Conservation Commission, and the IDL, as well as grazing BMPs that are defined by NRCS, USBLM, USFS, and IDL.

5. To identify any BMP implementation problems specific to a category of farm. This is critical to the flexibility of BMPs. If a BMP is found to be inadequate for the purposes of the Bruneau River Subbasin TMDL, then the land

management agency has the right to encourage the farmer to modify the practice to one that is more effective. It is the responsibility of the farmer to make the change, as long as it is voluntary, economically feasible, and still flexible enough to allow for additional changes if necessary.

6. To evaluate whether any agricultural practices cause environmental damage. Time constraints were previously identified in section 3.7.1 (point sources) and section 3.7.2 (nonpoint sources). The Bruneau River Subbasin TMDL will not support any nonpoint source practice causing damage to the environment.

7. To compare the effectiveness of alternative BMPs. This will come about as various facilities, ranches, and farms are compared according to the type of BMP applied and the results of such applications. Such comparisons will be submitted to the authorizing land management agency for their approval and comment.

8. To assess whether allocations are sufficient to attain water quality standards and beneficial uses.

9. To assess if short-term and long-term milestones are being met. IDEQ will oversee this assessment for all industries.

10. To describe who will carry out and finance the monitoring activities. Each industry will be responsible for its own level of compliance monitoring that defends its short-term and long-term goal attainment. Compliance monitoring includes, but is not limited to IDEQ monitoring for water quality in the various segments, the trend monitoring plan to be developed by the Bruneau Owyhee County SCD, and the NPDES required ambient water quality monitoring.

3.7.4 Legal Authorities that Defend Control and Management Actions

For point sources, IDEQ operates under the auspices of the NPDES federal permit program that is under the primacy of USEPA for aquaculture and municipalities. USEPA operates and enforces the permit, while IDEQ assists with inspections, compliance monitoring, and technical assistance. IDEQ; however , has statutory rights over the NPDES permits through its §401 Water Quality Certification for specific parameters. Under this certification, IDEQ can impose more stringent limits or monitoring requirements than what USEPA would request.

For nonpoint source CAFOs, an NPDES stormwater permit is secured by facilities that allows for discharge on a once per 24-hours during a 25 + year storm event. The Idaho Dairy Pollution Prevention Initiative Memorandum of Understanding signed by, IDEQ, Idaho Department of Agriculture, and USEPA allows Idaho Department of Agriculture to conduct the inspections for all CAFOs. Idaho Department of Agriculture has the statutory authority to revoke milk permits for recalcitrant operators.

For nonpoint sources like agriculture and grazing, no NPDES permits are required for discharging to canals, waters of the state, or waters of the United States. BMPs are supported and encouraged by IDEQ according to the recognized land management agencies that provide guidance and technical assistance (Table 38).

Table 38. RECOGNIZED LAND MANAGEMENT AGENCIES IN THE TMDL PROCESS

Nonpoint Source Activity/BMPs	Land Management Agency	Code/Regulations
Grazing with approved BMPs	Idaho Soil Conservation Commission, Idaho Board of Land Commissioners	IC §39-3602, IDAPA §58.01.02.003.72, IDAPA §58.01.02.350.03
Grazing for development, implementation, and revision of allotment management plan	Idaho Department of Agriculture	Grazing MOU (USFS, USBLM, U of I, IDA), Executive Order 98-09 (Allotment Management Plan on Public Lands)
Crop production with BMPs from Idaho Agriculture Pollution Abatement Plan	Idaho Soil Conservation Commission	IC §39-3602; IDAPA §58.01.02.003.72, IDAPA §58.01.02.350.03, IDAPA §58.01.02.054.07.
Silviculture with approved BMPs	Idaho Department of Lands, Idaho Board of Land Commissioners	IC §39-3602, IDAPA §58.01.02.003.72, IDAPA §58.01.02.350.03
Construction sites with approved BMPs	Idaho Department of Transportation	IC §39-3602, IDAPA §58.01.02.003.72, IDAPA §58.01.02.350.03
Septic tank disposal fields with approved BMPs	Idaho Department of Health and Welfare (District Health)	IC §39-3602, IDAPA §58.01.02.003.72, IDAPA §58.01.02.350.03
Mining with approved BMPs	Idaho Department of Lands, Idaho Board of Land Commissioners	IC §39-3602, IDAPA §58.01.02.003.72, IDAPA §58.01.02.350.03
Dairy operations	Idaho Department of Agriculture	Dairy MOU of 1995 (ISDA, IDEQ, USEPA, and IDA)
Other NPDES activities (aquaculture)	Idaho Department of Agriculture	IC §39-3602, IDAPA §58.01.02.003.72, IDAPA §58.01.02.350.03

It is evident from a historical perspective that to some extent nonpoint source pollution is the result of activities essential to the economic and social welfare of the state. It is recognized that the real extent of most nonpoint source activities prevents the practical application of conventional wastewater treatment technologies. However, nonpoint source pollution management, including BMPs, is a process for protecting designated beneficial uses and ambient water quality. BMPs should be designed, implemented, and maintained to provide full protection or maintenance of beneficial uses. Violations of water quality standards that occur in spite of implementation of BMPs will not be subject to enforcement action. However, if subsequent water quality monitoring and surveillance by IDEQ based on the criteria listed in IDAPA §58.01.02.200 and IDAPA §58.01.02.250, indicate water quality standards are not met due to nonpoint source impacts, even with the use of current BMPs, the practices will be evaluated and modified as necessary by the appropriate agencies in accordance with the provisions of IDAPA. If necessary, injunctive or other judicial relief may be initiated against the operator of a nonpoint source activity in accordance with the Administrator of IDEQ's authorities provided in §39-108 Idaho Code. In certain cases, revision of the water quality standards may be appropriate (IDAPA §58.01.02.350.01.a).

So long as a nonpoint source activity "is being conducted in accordance with applicable rules, regulations, and BMPs ... or in the absence of referenced applicable BMPs, conducted in a manner that demonstrates a knowledgeable and reasonable effort to minimize resulting adverse water quality impacts, the activity will not be subject to conditions or legal actions ... In all cases, if it is determined by the" Administrator of IDEQ "that imminent and substantial danger to the public health or environment is occurring, or may occur as a result of a nonpoint source by itself or in combination with other point or nonpoint source activities, then the" Administrator of IDEQ "may seek immediate injunctive relief to stop or prevent that danger as provided in §39-108 Idaho Code" (IDAPA §58.01.02.350.02.a). Other pertinent nonpoint source restrictions may be found in IDAPA §58.01.02.350.02 and 03.

3.7.5 Connectivity Effect

Pollution reduction management actions and control actions that occur in the Bruneau River Subbasin over the next 10 years will have a direct effect on subbasins downstream (CJ Strike Subbasin). This connectivity effect of a subbasin upon its downstream neighbor subbasin is a hydrological linkage that all TMDLs should address. The Bruneau River Subbasin in-stream targets for the Bruneau River and Jacks Creek will have a direct effect on subbasins into which they flow; namely, the CJ Strike Subbasin. In the case for the Bruneau River and Jacks Creek, the upcoming CJ Strike TMDL was a driving factor in determining the nutrient targets (0.05 mg/l TP). Because of the hydrological modification to the Snake River (the impoundment), stricter requirements for nutrient loads were required. To establish the connection between the Bruneau River Subbasin and the CJ Strike Subbasin, the lower targets were adopted. This action will allow for an easier transition for the residents in the Bruneau area when the CJ Strike TMDL is begun. However, the CJ Strike drainage will not be addressed for TMDLs until the year 2004. Streams added to subsequent §303(d) lists will be addressed for TMDLs in 2006 and beyond as time permits.

3.7.6 Feedback Loop and Adaptive Management

The feedback loop is a component of the Bruneau River Subbasin TMDL strategy that provides for accountability of plan goals for various pollutants. As part of the TMDL process, the Bruneau River TMDL will use adaptive management as a style and process whereby management of the watershed is initiated by the state, federal agencies, and the water user industries, then, an evaluation process will ascertain the direction in which the reductions are progressing, and, based on monitoring information collected from various agencies, organizations, and water users refine the goals, targets, and BMPs based on short-term and long-term objectives for ecosystem management of the Bruneau River watershed. Past management experiences may be used to evaluate both success and failure and to explore new management options where necessary. By learning from both successes and failures, the Bruneau River TMDL will be iterative to allow implementation of those techniques which may be most useful and helpful, as

well as gain insights into which practices best promote recovery for restoration of beneficial uses and state water quality standards (Williams et al. 1997).

For the Bruneau River Subbasin the main goal is to reach the preliminary in-stream water quality target of 50 mg/L TSS for all tributaries and to maintain the low TSS annual mean value already existing in the Bruneau River. Additionally, for the Bruneau River Subbasin an additional main goal is to reach the preliminary in-stream water quality target of 0.05 mg/L TP for the Bruneau River and Jacks Creek. Jacks Creek also has a preliminary in-stream water quality target of >5 mg/L DO. These preliminary targets are set up in this way to allow for modifications in the targets over the next 10-15 years to attain beneficial uses and state water quality standards.

In order for the feedback loop to be successful in the Bruneau River TMDL, a concrete mechanism has to be designed with short-term and long-term goals for the IDEQ-TFRO, industries, and the Bruneau River citizen groups. These entities must regularly review implementation progress, monitoring results, and evaluate plan effectiveness. Sufficient flexibility in management plans must be incorporated to allow for corrections in management strategies that may not be effective in achieving beneficial uses or state water quality standards. Both point and nonpoint source industries will follow the feedback loop by: 1) identifying critical water quality parameter(s); 2) developing site-specific BMPs; 3) applying and monitoring BMPs; and 4) effectiveness evaluations of BMPs by comparing established water quality standards and then modifying the BMPs where needed to achieve water quality goals.

The IDEQ-TFRO will review all monitoring results for point and nonpoint sources, and will provide an opportunity for the Bruneau River residents and USEPA to review and comment on an annual basis. Each industry will provide summary review/reports to the IDEQ-TFRO on its monitoring efforts, strategies, and on-going reduction mechanisms. Each industry will provide its own data in their reports. Based on these reports and other data, the Bruneau River Subbasin TMDL will be revised accordingly as an iterative plan. All industry plans will also be iterative and further developed through adaptive management as new knowledge and technology is discovered for pollution reduction efforts.

Additionally, because of the diverse nature of the partnerships and commitments within the Bruneau River Subbasin citizen groups from various agencies, organizations, and water users, both restoration and education efforts will be guided by IDEQ-TFRO via the SCD. The citizen groups will take advantage of partner technical knowledge, experience, existing management plans, and resources in determining which types of activities are appropriate for continued implementation of the Bruneau River Subbasin TMDL. The Bruneau River Subbasin citizen groups will continue to meet as needed. If needed, a technical advisory committee may be developed through the SCD and IDEQ. As a result, the citizen groups will have available to them the technical expertise of biologists, hydrologists, range conservationists, foresters, and other water quality and watershed specialists. Monitoring done by the various agencies, organizations, and water users will be evaluated by IDEQ-TFRO, the technical advisory committee, and citizen groups as a feedback mechanism. This will provide to the citizens of the Bruneau Subbasin an evaluation that is scientifically based as well as having an understanding of local constraints. Through such adaptive management scientific knowledge will be adapted to the task of watershed restoration by the residents of the subbasin almost immediately.

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5.0 Appendix A

SEGMENT	DATE	Q	TSS	NH4	TKN	N+N	TP	TURB	ECOLI
Bruneau up	08/13/1998	53	1	0.007	0.21	0.064	0.025		3
Bruneau up	04/25/2000	1005.61	17	0.012	0.34	0.024	0.046	5.5	
Bruneau up	05/11/2000	1291.59	10	0.008	0.29	0.02	0.029	4.2	3
Bruneau up	06/01/2000	1306.56	17	0.014	0.21	0.03	0.04	4.4	3
Bruneau up	06/14/2000	1077.49	1	0.006	0.17	0.026	0.019	1.5	
Bruneau up	07/06/2000	435.85	1	0.011	0.15	0.077	0.012	0.7	6
Bruneau up	07/19/2000	220.77	2	0.011	0.21	0.11	0.012	0.65	1
Bruneau up	08/02/2000	135.05	2	0.012	0.24	0.158	0.011	3.6	1
Bruneau up	08/16/2000	93.82	1	0.01	0.12	0.188	0.012	0.6	2
Bruneau up	08/31/2000		0.5	0.009	0.12	0.209	0.011	0.54	4
Bruneau up	09/12/2000		0.5	0.013	0.09	0.17	0.009	0.4	2
Bruneau up	09/21/2000								1
Bruneau low	08/14/1998	53	0.05	0.013	0.025	0.025	0.091		190
Bruneau low	04/25/2000	1005.61	27	0.017	0.32	0.036	0.06	6.2	
Bruneau low	05/11/2000	1291.59	17	0.018	0.34	0.041	0.041	5.6	26
Bruneau low	06/01/2000	1306.56	20	0.009	0.23	0.022	0.05	5	43
Bruneau low	06/14/2000	1077.49	5	0.014	0.38	0.027	0.033	1.6	
Bruneau low	07/06/2000	435.85	4	0.036	0.38	0.0025	0.086	1.4	180
Bruneau low	07/19/2000	220.77	5	0.034	0.45	0.008	0.072	1.7	24
Bruneau low	07/19/2000	220.77	4	0.035	0.42	0.009	0.073	1.5	13
Bruneau low	08/02/2000	135.05	4	0.019	0.72	0.0025	0.122	4	5
Bruneau low	08/16/2000	93.82	6	0.022	0.89	0.0025	0.2	2.4	1
Bruneau low	08/31/2000		6	0.019	0.81	0.009	0.088	4.3	180
Bruneau low	09/12/2000		4	0.024	0.5	0.009	0.057	3	40
Bruneau low	09/21/2000								32
Jacks Creek	04/25/2000		73	0.019	0.98	1.71	0.244	19	
Jacks Creek	05/11/2000		96	0.033	1.12	1.88	0.296	26	2400
Jacks Creek	05/18/2000								2400
Jacks Creek	06/01/2000		81	0.042	1.14	1.43	0.302	22	920
Jacks Creek	06/14/2000		45	0.019	0.93	1.69	0.21	7.6	710
Jacks Creek	07/06/2000		8	0.021	0.58	1.65	0.102	2.4	920
Jacks Creek	07/19/2000		15	0.021	0.81	1.76	0.142	2.8	540
Jacks Creek	08/02/2000		25	0.031	1.06	2.98	0.128	3.7	730
Jacks Creek	08/16/2000	3.871	32	0.026	1.14	3.35	0.188	5.1	520
Jacks Creek	08/31/2000		3	0.046	1.05	3.58	0.148	2.3	2100
Jacks Creek	09/06/2000								240
Jacks Creek	09/12/2000		26	0.035	1	3.09	0.225	5.7	510
Jacks Creek	09/14/2000								1100

Segment	date	Q	TSS	NH4	TKN	N+N	TP	TURB	ecoli
Jacks Creek	09/18/2000								1200
Jacks Creek	09/21/2000								148
Hot Creek	06/14/2000		0.05	0.0025	0.025	0.673	0.029	0.4	45
Hot Creek	07/06/2000		0.5	0.0025	0.025	0.676	0.01	0.37	1
Hot Creek	07/19/2000			0.008	0.1	0.694	0.024		110
Hot Creek	08/02/2000		5	0.016	0.3	0.669	0.054	1.9	2
Hot Creek	08/16/2000	0.3225	1	0.0025	0.025	0.684	0.011	0.4	2
Hot Creek	08/31/2000		14	0.0025	0.44	0.546	0.093	1.9	10
Hot Creek	09/12/2000		0.05	0.011	0.025	0.678	0.016	0.4	6
Hot Creek	09/21/2000								82
wick trib	05/13/2000		31	0.022	0.35	0.568	0.096	9.6	120
wick trib	06/01/2000		15	0.045	0.4	0.594	0.087	6.8	
wick trib	06/14/2000								920
wick trib	07/19/2000								290
wick trib	08/02/2000		9	0.02	0.26	0.416	0.081	5	
wick trib	08/16/2000		14	0.025	0.36	0.516	0.084	5.1	120
wick trib	08/31/2000		63	0.031	0.31	0.44	0.129	17	81
wick trib	09/06/2000								53
wick trib	09/12/2000		62	0.03	0.43	0.783	0.171	15	380
wick trib	09/14/2000								74
wick trib	09/21/2000								26
wick low	06/23/1998		9	0.008	0.45	0.01	0.093		
wick low	06/29/1998		9						
wick low	05/11/2000		2	0.014	0.25	0.0025	0.041	4.3	610
wick low	05/13/2000		2	0.014	0.25	0.0025	0.041	4.3	
wick low	05/18/2000								120
wick low	06/01/2000		7	0.038	0.65	0.013	0.08	5	980
wick low	06/14/2000		82	0.038	0.94	0.014	0.276	8.4	23
wick low	07/06/2000								24
three	04/26/2000		21	0.019	0.51	0.008	0.124	9.2	10
three	05/11/2000		4	0.012	0.44	0.006	0.11	7.7	14
three	05/13/2000	15.35	10	0.022	0.36	0.01	0.088		
three	06/01/2000	9.9865	14	0.018	0.41	0.006	0.116	5.2	
three	06/14/2000	5.2985	3	0.011	0.34	0.0025	0.11	0.3	
three	07/06/2000	0.76	2	0.015	0.38	0.0025	0.099	2.6	
three	07/20/2000	0.265	12	0.014	0.38	0.0025	0.089	4.5	
three	08/02/2000	0.06	20	0.028	0.68	0.0025	0.102	8.5	

segment	date	Q	TSS	NH4	TKN	N+N	TP	TURB	ecoli
clover upper	05/10/2000		10	0.02	0.45	0.0025	0.105		41
clover upper	05/13/2000	28.592	13	0.021	0.46	0.008	0.088		
clover upper	06/01/2000	18.135	8	0.013	0.38	0.0025	0.118	3.9	
clover upper	06/13/2000	10.559	7	0.013	0.35	0.0025	0.087	0.6	
clover upper	07/06/2000	1.86	4	0.013	0.36	0.0025	0.08	2	
clover upper	07/20/2000	0.9875	5	0.015	0.48	0.005	0.072	2.5	
clover upper	08/02/2000	3.947	7	0.027	0.45	0.014	0.074	4	
clover upper	08/13/2000								39
clover upper	08/16/2000	1.6825	6	0.018	0.44	0.009	0.08	2.6	20
clover upper	08/31/2000	0.849	16	0.02	0.51	0.018	0.091	5	55
clover upper	09/12/2000	0.936	3	0.028	0.4	0.015	0.062	3.7	1300
clover upper	09/19/2000								74
clover upper	09/21/2000	1.076							490
clover upper	09/25/2000								360
clover mid	08/13/1998								47
clover mid	05/10/2000		4	0.019	0.55	0.0025	0.085		22
clover mid	05/13/2000	27.194	5	0.023	0.47	0.0025	0.076		
clover mid	06/13/2000	5.67	4	0.016	0.42	0.0025	0.048	0.3	
clover mid	07/20/2000	0.4645	6	0.04	0.89	0.031	0.095	3.8	
clover mid	07/26/2000								100
clover mid	08/02/2000	0.055	7	0.034	0.39	0.006	0.097	6.4	
clover mid	08/10/2000								100
clover mid	08/14/2000								74
clover mid	08/16/2000	0.9455	4	0.026	0.66	0.03	0.087	3.4	48
clover mid	08/31/2000	0.029	92	0.228	1.57	0.056	0.201	27	2100
clover mid	09/12/2000	1.178	6	0.034	0.55	0.028	0.063	6.2	1600
clover mid	09/14/2000								1500
clover mid	09/18/2000								170
clover mid	09/21/2000	0.688							47
clover mid	09/25/2000								22
clover lower	06/01/2000	16.167	2	0.014	0.49	0.005	0.07	2.4	
clover lower	07/06/2000	0.12	1	0.022	0.62	0.007	0.064	2.4	

6.0 Appendix B

Public Comments

Two letters were received within the deadline set by the public announcement and public comment period, no other written comments were received. Both letters were electronically submitted to IDEQ via Clyde Lay's e-mail. To facilitate incorporation into the document the text was inserted into the Bruneau River Subbasin Assessment and TMDL. IDEQ responses, as appropriate, are in bold faced italics.

Text Copied from Donna Walsh for USEPA. Letter to Clyde Lay, December 19, 2000.

Re: Bruneau Subbasin Assessment and Total Maximum Daily Loads
November 20, 2000 Draft

Thank you for the opportunity to review the draft Bruneau subbasin assessment and Total Maximum Daily Loads. Overall we believe the assessment is heading in the right direction, but we have some concerns with the proposed delisting of certain water bodies and with elements of draft TMDLs, as articulated below.

CJ Strike Reservoir

We recommend clarifying up front in the assessment why the Bruneau arm of CJ Strike Reservoir is not being included in this assessment and TMDL. Technically it is located in the Bruneau HUC, and the 1998 303(d) list shows it being scheduled for TMDL development in 2000. Our understanding from discussions with IDEQ staff is that the Bruneau arm will be assessed and included in the TMDL for CJ Strike Reservoir in 2004. It would help the reader to explain these circumstances in the Bruneau SBA, and this clarification should also be provided to plaintiffs in the current Idaho TMDL schedule litigation as it is an apparent deviation from the schedule established in 1997.

Language explaining the delay of the Bruneau Arm of CJ Strike Reservoir was added to the SBA.

Annual Averages

The first paragraphs of many of the 2.4.* sections state *"Due to the limited number of sampling periods in the data set, IDEQ's confidence in monthly average concentrations was low. Therefore, IDEQ will present the information as annual average concentrations.*" Several times in the document, a water is assumed to be meeting the water quality standards because the annual average is below the guideline. However, the targets chosen and the water quality standards are not given in annual averages, but in monthly averages. The annual averages mask what is happening in the water. For example in Jacks Creek, because the annual average of sediment is lower than the 50 mg/L TSS guideline, the document states that it appears *"..sediment is within the bounds of water quality determined to be supportive of the designated*

beneficial uses..." However, if you look at the data presented in Appendix A, TSS monthly averages were above the 50 mg/L guideline for three (April, May, and June) of the 6 months data was available. Annual averages cannot be used in comparison to monthly guidelines and standards. The monthly data available, though limited, should be presented in the 2.4.* sections, and used to compare to the monthly TSS targets.

Data presented as annual averages were changed to reflect monthly and daily average targets and guidelines in the appropriate sections of the document. As a result of presenting the data as monthly and daily values, a TSS TMDL will be completed for Jacks Creek.

Required TMDL elements

It is very helpful to have sections labeled discussing each of the required TMDL elements.

Water Quality Standards - It is not clear which nutrient guideline applies to the different waters. For example, in the second paragraph of section 2.4.6 the statement is made "Average TP concentrations are slightly higher than EPA guidelines at 0.067 mg/L." This statement appears to be saying the that 0.05 mg/L guideline (for waters going into lakes or reservoirs) applies. However the next paragraph states that nutrients (at the middle sampling site in the same water) are below the applicable standard at 0.081 mg/L. Which nutrient guideline applies to each water should be clearly stated. Since the Bruneau River discharges into CJ Strike Reservoir, which is also listed for nutrients, it would appear that the target should be no greater than 0.050 mg/l TP.

The water bodies to which specific nutrient guidelines applies were better clarified. Nutrient TMDLs will be completed on Jacks Creek and the Bruneau River. Both of these systems flow into a reservoir. As a result, the nutrient guidelines applied to these waters was 0.05 mg/l total phosphorus. Comparisons with the daily maximum and monthly average TP guidelines were better clarified. Data from all other waters were compared to the 0.16 mg/L TP daily maximum guideline when only one data point existed in a given month. When two or more samples were collected in a month the 0.1 mg/L TP guideline was the point of comparison.

Critical conditions and seasonal variation - Under the critical conditions section, the document references the analysis of the existing water quality data found in the 2.4.* sections, saying that the analysis shows how the critical periods were identified. However, it is impossible to tell from the information given in 2.4.* when the critical periods might be since only annual average information (no monthly data) is provided. The monthly data found in Appendix A should be provided in these sections. Also, the hydro graphs sited in the critical conditions section, should be provided in the text or as an appendix. Without this information, it is not possible to determine how your critical period discharge numbers are developed. **This information is needed for the TMDL to be approvable .**

Critical conditions were better identified through presenting the data as monthly averages. Critical conditions are first identified when water quality conditions exceeded targets and guidelines, and secondly when the ecological significant period of elevated pollutants will degrade beneficial uses. For example, TP is elevated at all times in Jacks Creek; however, it is ecologically significant only during the spring and summer growing periods. Therefore, the critical conditions for Jacks Creek, for TP, would occur during periods in which concentrations are elevated and only during the spring and summer. Therefore, the critical conditions were determined to be the low flow period during the summer.

The Hydrology graphs were available in much earlier sections of the document. Better referencing of those figures were made in the document.

Loading Capacity - Since the loading capacity of the TMDL is based on the discharge under critical conditions, how the critical conditions were identified and how the critical condition discharge was determined must be clearly shown to understand the loading capacity. **How the loading capacities are determined must be more clearly presented for the TMDL to be approvable**.

Critical conditions and loading capacity clarifications were made in the document.

Load Allocations - It appears that the loads are allocated by the percentages of land under different uses. However one of the nonpoint source land uses identified is "riparian and water" or "riparian". It is not clear what is meant by this term or how this load would be reduced, unless you expect to increase the riparian area. This term should be better defined and how the load reduction will occur stated.

The Riparian land use was better defined as to its contribution and potential reductions from that source.

<u>Listing Issues</u>
Delisting of ephemeral/intermittent streams

IDEQ is proposing to delist Sugar Creek, Cougar Creek, and Poison Creek *"due to the hydrology of the creeks"* i.e. that they are intermittent or ephemeral. IDEQ further states *"At such time that water quality standards are developed for ephemeral waterbodies IDEQ will review the delisting of the creek."* . Though it would be difficult to do a TMDL on these waters as they were dry when the state attempted to collect data, waters cannot be taken off the list simply on the basis of being intermittent or ephemeral waters. Intermittent/ephemeral waters are still waters of the state and the same standards apply.

Given the lack of flow and water quality information in this situation, we have two recommendations for assessing the three listed ephemeral waters. First, if monitoring of the nearest downstream waterbody demonstrates that the downstream water meets water quality standards, we think it would be reasonable to assume that the upstream ephemeral water also meets water quality standards, provided there is no information to the contrary. Our understanding is that Cougar and Poison Creeks are in this category, and an explanation and rationale along these lines in the SBA would be an adequate basis for delisting.

Thank you for your guidance in this matter. IDEQ has attempted to make the appropriate changes for Cougar and Poison Creeks.

The second recommendation is in the case of Sugar Creek, a tributary to Jacks Creek which is listed for nutrients, sediment, DO and temperature. Since Jacks Creek is known to have water quality problems, it would not be reasonable to assume that ephemeral tributaries meet water quality standards. However, if an evaluation of these tributaries concludes that there are no sources or causes of the downstream listed pollutants within the watershed, and this is explained and documented in the subbasin assessment, it would be an adequate basis for delisting. If sources or causes of listed pollutants are identified in the watershed, we do not believe it would be reasonable to delist the ephemeral water, rather it should be included in a TMDL for the larger downstream water, Jacks Creek in this case.

The approaches described above are simply suggestions on our part, and should not be construed as the only way to assess and address these waters. We would be happy to discuss the specifics of these approaches and any other options you may wish to consider, at your convenience.

IDEQ has better clarified the original listing error of Sugar Creek and has included Sugar Valley Wash in the Jacks Creek allocation scheme. Therefore, IDEQ will go forward with the correction to the §303(d) list in the case of Sugar Creek and Sugar Valley Wash will become part of the Jacks Creek TMDLs

Inconsistencies

There are several waters where the document states the waters are supporting beneficial uses in one place, but provides information in another place that supports the waters being listed and TMDLs done.

Jacks Creek - Sediment

The target of a monthly average of 50 mg/l TSS with a daily maximum of 83 mg/L TSS is proposed. On page 53, the document states *"Jacks Creek exceeds the 50 mg/L TSS guideline in almost all cases."* However, on page 58 IDEQ states that it appears that Jacks Creek is supportive of beneficial uses for sediment based on the yearly average. In Appendix A, it also shows that Jacks Creek exceeds the monthly average target of 50 mg/l in April, May and June, three of the six months for which data was collected.

A sediment TMDL for Jacks Creek will be completed.

Three Creek - nutrients
On page 52 , in the second full paragraph on the page, it is stated that Three Creek "exceeds the 0.1 mg/L TP Guidelines in almost all cases". On page 65 it states that IDEQ has found nutrients to be within the bounds of water quality standards for Three Creek and will not do a TMDL.

An error occurred in the document. Three Creek does not exceed the nutrient guidelines. See changes in sections 2.4.* for further clarification. Additionally, note changes made to present data as monthly averages. Also, note application of appropriate standard and guideline. Daily maximum guideline for those months with one sample, monthly average for those months with two or more samples.

Wickahoney Creek - sediment, nutrients, bacteria
IDEQ states that no TMDLs will be required for Wickahoney Creek, using annual averages as the basis for this decision. However, Appendix A shows:

wick trib - 2 of 6 samples violate TSS and TP guidelines
1 of 9 samples violates the bacteria single sample standard

wick low - 1 of 6 samples violates TSS and TP guidelines
2 of 5 samples violate bacteria single sample standard

See comments from above. Additionally, State standards for recreational beneficial uses are interpreted by the State to mean that one sample exceeding the instantaneous standard requires further monitoring of at least five samples in a 30 day period. After which a water quality and beneficial use degradation status call is made if the geometric mean is above 126 cfu/100 ml. The Wickahoney samples do not exceed the 126 cfu/100 geometric mean standard.

Editorial comments
Many maps are provided in this document, but I could not find one that showed the location of each of the listed streams. It would be very helpful to have a map showing the names of the waters in the beginning of the document.

This figure has been added to the document.

Page 43
The text states that there are 9 water bodies listed, but only 7 water bodies appear in Table 5. It appears that Table 5 is missing Clover Creek and Cougar Creek.

This change was made to the table. Note table change to Table 8.

Page 66
The tables found on this page showing what TMDLs will be done, what waters are proposed for delisting and what waters will have TMDLs delayed are very helpful. I would suggest putting these tables closer to the beginning of the document or perhaps referencing them in the executive summary since they are very helpful in getting the bigger perspective of what Idaho is proposing in the subbasin.

These tables were moved into the executive summary.

Page 81
In the nutrients section it states that the target for Wickahoney Creek shall be a monthly average of 0.10 mg/L of TP with a daily maximum of 1.6 mg/L to allow for natural variability. Wickahoney Creek is not on the 1998 303(d) list or on the list on page 66 showing the TMDLs being done in the Bruneau Subbasin or in the TMDL section. Though it appears from data in Appendix A that a nutrient TMDL for Wickahoney Creek is necessary, and we would support doing so, it does not appear from the rest of the document that one is being done.

See section 2.4* for further clarification.

Text Copied from e-mail from John Ash USBLM. MEMO to Clyde Lay, December 18, 2000.

Addressed below are comments or concerns the BLM-Jarbidge Field Office has regarding the Draft Bruneau River Subbasin TMDL for 2000.

1. Maximum Water Temperature Standard Exceeded for cold water biota streams:

According to BLM's (Jarbidge Field Office) long-term creek water temperature data for Clover Creek and Three Creek over the past 6 to 9 years, which are both classified as cold water biotas, we feel that these creeks should be listed for not meeting the maximum water temperature standard of 22 degrees Celsius, as well as for those other pollutants identified in the TMDL. Our data shows that every year this temperature standard is exceeded on almost a daily basis for the months of July and August in these creeks.

This SBA-TMDL deferred all temperature issues until a later date. However, IDEQ will use the USBLM data in future iterations of the §303 (d) list. Currently IDEQ is working on water

body assessment guidance which will incorporate temperature data. At that time decisions as to which streams will be listed for temperature will be made.

2. Delisting of Cougar and Poison Creeks:

We agree with the delisting of Cougar and Poison Creeks for reasons of not supporting biota and the fact that they are ephemeral in nature.

Thank you for your comment.

3. Delisting of particular creeks from the 1996 303(d) list to the 1998 303(d) list:

We are curious as why or how Big Flat Creek and Deadwood Creek became delisted in the 1998 303(d) list and not mentioned at all in the draft TMDL? We feel strongly about the poor water quality conditions of these streams, especially for fisheries habitat. We feel and have knowledge that both these streams have beneficial uses of salmonid spawning habitat and are cold water biotas. Also, we have probable reason to believe that these streams are not meeting temperature, sediments and bacteria State standards and should be added back on to the list and be addressed in this TMDL because of these pollutants.

Those streams were removed from the §303(d) list in 1998, following extensive public comment. The rational for delisting were that beneficial uses were documented to be full support through biological assessment. The streams can be added back onto the list and TMDLs scheduled for completion following assessment. The assessment process for future iterations of the §303(d) list is currently in draft stages. A public comment period and peer review are scheduled. Additionally, prior to the release of the next §303(d) list IDEQ will gather new information from other sources for inclusion into the listing process.

Additionally, IDEQ has agreed, as part of ongoing litigation of the 1996 and 1998 §303(d) lists, to reevaluate any stream removed from the 1996 list. Your concerns have been forwarded to the appropriate IDEQ personnel in charge of water body assessment and §303(d) listing issues.

4. Data collection period:

Much of the period in which DEQ collected their data was not during a "normal year" (2000). Flows were way below average or normal for most creeks in the TMDL area all year long because of the dry conditions.

Due to court ordered deadlines IDEQ is to proceed with TMDLs regardless of quantity of data. In an ideal world more samples would have been collected outside of a drought year. However, IDEQ does not have that ability due to the tight timelines throughout the state. Additionally, TMDLs are based upon critical conditions in a system. These conditions are often associated with low flow periods. Therefore, the assessments made in this document are more reflective of the low flow period due to the drought conditions. However, the implementation phase of the TMDL is still eighteen months away. During this periods additional water samples could be collected to reflect conditions outside of a drought period.

5. BLM data;

There was hardly any mention of analyzing offered BLM data. BLM has collected much data over time, not just this past year, and hardly any of it was used in this TMDL analysis.

Much of the USBLM data is PFC data. This information will be relied upon very heavily during the implementation phase of the TMDL. In many regards it will be the backbone of the implementation plans developed by the landowners and SCC in regards to grazing and agriculture.

We appreciate the opportunity to make comments about this TMDL. Thank you for your time and attention on these matters and we look forward to working with your department in improving and maintaining the water quality in all streams in the Bruneau River Subbasin. Please keep us informed of all updates and meetings concerning the final development and issuance of this TMDL.